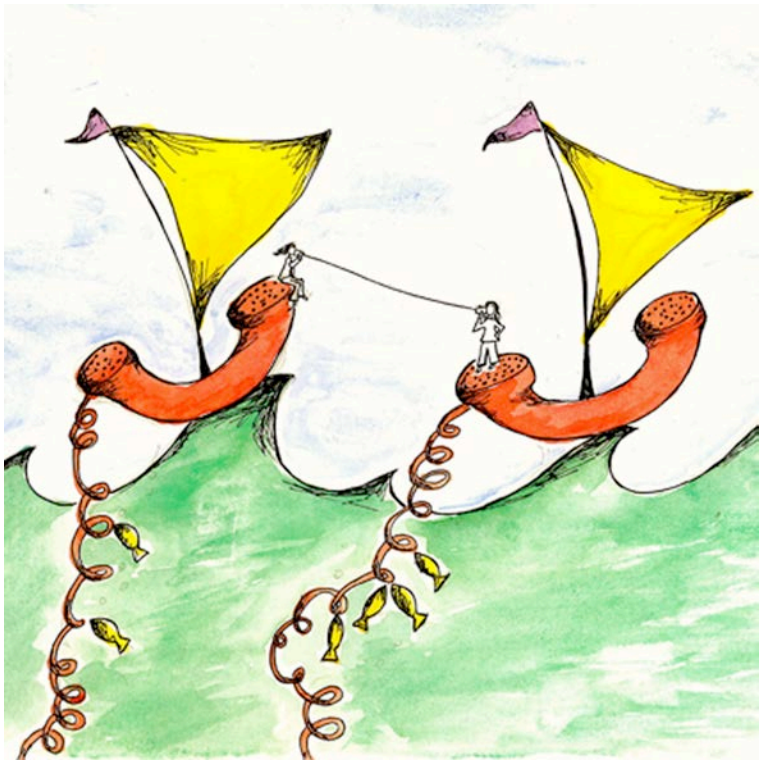
Just a game?

Playing in pursuit of sustainability, inclusion and justice in small-scale fisheries in the Philippines



by

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Cover image: Millie Rooney, commissioned by the author for love and friendship.

Candidate's Declaration

This thesis is my own work, except where otherwise acknowledged.

Deborah Cleland Date:

Dedication

For my Grandmothers:

Rosemary Langemarck Bromwich nee Lewis

Orchid breeder, Nurse, Champion swimmer, Golfer

Dahlas Roberta Cleland nee Wagstaff

Twitcher, Landcarer, Pharmacist, Activist, Singer

Clare A Rae nee Wickham

Cook, Histologist, Art collector, Horticulturist

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Abstract

Humans have a fishy problem: overfishing threatens livelihoods and food security the world over. Attempts to address this problem through research, education and engagement can result in a loss of hope, a palpable sense of being a drop in the ocean – irrelevant and overwhelmed. What happens, then, when trying to write a thesis about it?

A conventional thesis is a single story. I argue this is not enough. Here, I tell five stories, each a different perspective of my experience designing and playing 'ReefGame' with stakeholders in the Philippines. ReefGame is a computer-assisted fishing game to explore the problem of too few fish for the humans that want to catch them. This thesis is an autoethnography; one that experiments with the form to show how telling more than one story avoids paralysis and unhelpful binary thinking when attempting to engage ethically with 'fishy problems'.

The five stories are stand-alone papers, each corresponding to a lens offered by Valerie Brown's knowledge cultures framework for conducting open transdisciplinary inquiries – individual, community, expert, organisational and holistic. Each paper answers a facet of the overarching question 'did the game work, how, for whom and why?', using data collected from participant observation of preparing for and running ReefGame in stakeholder workshops across the Philippines, under the auspices of a philanthropically funded 'tool demonstration' project.

I argue playing ReefGame was an act of hope, necessary for *personal* agency in the context of worsening environmental problems. The game stimulated dialogue and engagement, critical for building *community* knowledge, and so I offer an empirically-derived and principles-based game design method that others can follow. My *empirical* analysis of gaming decisions complements standard ways of examining fisher behaviour, particularly for understanding contextual and non-economic drivers for livelihood choices. As stakeholder workshops are an *organisational* staple, analysing participants' micro-interactions in the game offers insights for making workshops more inclusive.

Finally, a *holistic* lens means examining the broader enterprise of scholarly production, and producing scholars. A diffractive comparison between my research career and the fishers' livelihoods in current capitalism almost strips us of the hope with which I began. Nevertheless, I make a stake for collective, creative activism as the hopeful recommended 'next step', concluding that integrating diverse ways of acting, both within and outside academia, is the best path for engaging ethically with fishy problems.

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List of acronyms and abbreviations

BFAR: Bureau of Fishery and Agricultural Resources (Philippines)

EBM: ecosystem based management

CBCRM: Community-based Coastal Resource Management

COMECO: Community Ecology Laboratory, the research group I was based at in the University of the Philippines Marine Science Institute (UP-MSI_

CRTR: Coral Reef Targeted Research (and Capacity Building for Management) project, funded by the Global Environment Facility (GEF) and the World Bank

FAO: Food and Agriculture Organisation of the United Nations

FindFishSup: "Finding a way out of Depleted Subsistence Fisheries in the Philippines", a project funded by the Packard Foundation to demonstrate EBM tools

GEF: Global Environment Facility

COMECO: Community Ecology Laboratory, the research group implementing FindFishSup

LGU: Local Government Unit – municipal governments in the Philippines

MERF: Marine Environment Resource Foundation, philanthropic arm within UP-MSI

MPA: Marine Protected Area

UP-MSI: University of the Philippines Marine Science Institute

Glossary and terms specific to Filipino fisheries

Barangay: smallest political unit in the Philippines (roughly translated to 'village')

Bantay Dagat: coast guards of the municipal waters, usually voluntary or paid a small stipend

LGU: Local Government Unit – municipal governments in the Philippines

Municipal waters: marine waters up to fifteen (15) kilometres from the coastline, under the management of the Local Government Unit (LGU)

Small-scale fishers: as per Filipino fishery laws, any fisher operating with (or without) a boat weighing three tonnes or less, and usually fishing within municipal waters

Nearshore fishers: small-scale fishers who fish in municipal waters

Prologue: the virtual dive machine

July 2012, Cairns, Australia

Back in the bosom of the whitest (definitely), safest (maybe) Asia-Pacific (perhaps?) nation, I'm temporarily ignoring the tatters of my life by attending the world's largest coral reef conference for the second time. Despite a feeling of gratitude for being among my tribe, of sorts, I'm tired and disillusioned: the contrast from the 2008 conference near Miami, just before I started my PhD, could not be starker.

It is the final plenary speech of the conference, and I am sitting up the back, poised to make a quick exit if it gets dull. The speaker, an ecologist, tells us a story, the lines as familiar now as a fairy-tale, though one that's more Atwood than Blyton. Humans have exceeded even the worst expectations of our climate experts. We have catapulted beyond the highest emissions scenario, making ocean temperatures that kill corals not a decadal risk but an annual expectation.

Just when the speaker's effective rhetoric has brought the audience to sighs, shakes of the heads, and perhaps, hidden in the dark, the occasional tear, he draws us in close. "But wait", he says, "We still have a chance". A chance to change the lifetime long habits, wants, desires and habitual patterns of behaviour of hundreds of millions of our fellow inhabitants of the blue planet. He says, "You can be part of this too." He wants to tell us about a new persuasive technology that will lead us out of the dark and into a new and enlightened age.

I creep forward on my seat. I, too, want something simple. Something easy. A hammer-like tool that will fix our naily problems. I reflect that my own tool, a board game designed not just to persuade, but also to educate and engage fishers who were impacting their reefs on a more local scale about 4000km to the north, had mixed results, as my own presentation had earlier testified, but surely this guy would have something really worthwhile.

A virtual dive machine.

A 3-D, online, videoed reef-like experience.

"Your reef can be filmed!" he says. "When people experience the sublime beauty, how can they fail to be moved?"

People around me nod, remembering their last, or first, suspension in our submarine paradise. Reef scientists, both social and ecological, are almost universally divers. Heaven does not exist above, they know. It is there below, just beyond our coastlines, a world of wonder and exquisite loveliness.

Yes. The perfect tool. Who would kill a coral?

Telling this story in this way is a betrayal of sorts: of his hope, faith, and good intentions. Easy to throw stones from ivory towers, my social science peers and I usually seek to explain and understand our species' road to self-destruction rather than alter it. And who am I to say what will convince everyone else?

A mean voice inside me says 'if Nemo couldn't, this certainly can't', and my scholarly index says 'not the way the world works', but impact and persuasion tendrils are unwieldy, and this man's eggs are not all in his virtual dive basket. His cross-platform efforts to promote and convince may yet yield the fruits of change, across our region and beyond.

Although, five years later as the second year of unprecedented bleaching and coral mortality is devastating the world's biggest reef, mere kilometres from where this man stood, it might be time to try something else.

Here's what I tried...

[An edited version of a blog first posted on onefishtofish.com on October 10, 2012]

***

Introduction

Fish (Matilda Michell, reproduced with permission)

fishy |ˈfɪʃi| adjective (**fishier**, **fishiest**) 1 relating to or resembling fish or a fish: *a fishy smell*.2 *informal* arousing feelings of doubt or suspicion: *I'm convinced there is something fishy going on*.

Oxford Online Dictionary

Overview

Earth's oceans are emptying: ninety per cent of the world's fisheries are at or over capacity (FAO, 2016). That this is a great problem for poor coastal communities is the backdrop of this thesis wherein five stories of the fish, the fishers and the studiers of fisheries will be told.

Do fishy problems need playful solutions? I thought so. But after making a game, a serious one, and playing it, with lots of Filipino fishers, scientists, government workers and NGO representatives in workshops as part of a two-year project to find a 'way out' for depleted fisheries, I was not so sure. However, as I aimed to do open transdisciplinary research, the objective of which is to learn, act and learn again, then it was worth distilling what happened and why, before deciding what to do next (Brown, 2010b). And so, this thesis gives an account of research done to design, play and analyse the use of 'ReefGame 2.0' (hereafter ReefGame), a computer model-assisted board game I designed as a tool for exploring marine conservation and livelihoods through workshops in poor fishing communities of the Philippines, a place where emptying oceans have been causing problems over many decades (Aliño *et al.*, 2004).

Using a case study of FindFishSup, a project applying ReefGame, I ask the question: How might development researchers ethically intervene in sustainability, inclusion and justice challenges – what I call here 'fishy problems'? Within this I ask: did ReefGame work as such an intervention; how, for whom and why? Using an open transdisciplinary methodology, I employ Valerie Brown's (2010b) five knowledge cultures – individual, community, expert, organisational and holistic[1] – to frame five different but interrelated answers to these questions, contained in stand-alone papers, listed below. The 'knowledge cultures' framework was designed to facilitate and analyse collective decision-making processes for sustainability (Brown, 2010b). I create a novel extension of Brown's framework by applying each of the knowledge cultures to understand a particular aspect of my experience of game-playing for research. Drawing primarily on participant observation, supplemented with ReefGame workshop video recordings and game data, project documentation, and interviews with project staff, I analyse the use of the game as a tool for learning and engagement. As I was designer, operator and evaluator of ReefGame, this thesis is best understood as a project autoethnography, with a key

1 Brown interchangeably uses the following terms for the five: 1) individual/personal; 2) community/local; 3) expert/disciplinary/specialised; 4) organisational/institutional; and 5) holistic/creative.

informant being myself (Mosse, 2005). It is, however, an unusual autoethnography in that instead of an ethnographic lens being turned on the self, I fit five lenses in turn to pursue an integrated mosaic of a single experience.

Using ethnographic methods to understand and critique the role of 'development professionals', often through the auspices of short-term projects, is now common (for an overview and a critique, see Harrison, 2013). David Mosse's edited collection *Adventures in Aidland* (2011b), is an early and well-known example, and follows a broader trend to shift the lens from how *communities* (particularly rural, poor ones) structure their activities and knowledge to how *institutions* (particularly rich, powerful ones) do (Mosse, 2011a). My project differs, however, from most in this genre, in three key ways. First, it has a meta-focus on the role of academic rather than development institutions in 'knowledge production', particularly in the first and last papers of this thesis. Secondly, it is explicitly autoethnographical, examining my experience of the FindFishSup project and the endeavour of creating scholarly knowledge. Thirdly, I integrated Brown's knowledge cultures (Brown, 2010a) into an autoethnographic lens, a methodological extension.

Within the autoethnographic lens, the five papers herein each correspond primarily to one of Brown's knowledge cultures. In Table 1 each paper is briefly introduced, along with its contribution to the overall narrative arc of the thesis, and knowledge culture, methodology and the data used. This presents a deceptively linear picture, but in pursuing integration there are certainly moments of overlap, gap, failure, and contradiction across the thesis as a whole. I attempt to address these tensions in the preface to each paper, and draw the lessons learned together in a final conclusion, but, as Wickson et al (2006: 1054) point out, paradox can be considered a "necessary (and perhaps unavoidable) feature" of transdisciplinary research. My research design is expanded in the second half of the introduction, but Table 1 is provided in this section to orient the reader as to the overall structure of the thesis.

The remainder of this introduction justifies the research question by answering 'Why the Philippines, why fishing, and why a game?', and introducing my previous research in this field. Following, I describe the FindFishSup project that framed the playing of ReefGame in workshops, my role in those workshops and my misgivings about both. The second half of the chapter presents my research design. Open transdisciplinary inquiry is the overall methodology, accompanied by the 'critical learning spiral', a process-based framework to guide the specific choices made as the project unfolded. I then elaborate how these attempt at transdisciplinarity played out in practice, using the concept of the

'research journey' (McGowan *et al.*, 2014) to explore some of the ways that collaborative, cross-cultural and time-bound projects create friction with the ideals of open, evolving methodologies (van Kerkhoff, 2014). Working with this friction, I explain how integrating Brown's knowledge cultures (Brown, 2010a) with an autoethnographic lens helped to me to "write differently" (Fisher *et al.*, 2015) and reinscribe my research journey with an ability to see – and make – hopeful contributions to knowledge through attention to affective, dialogic, disciplinary, practical and creative stories respectively. Each of the papers corresponding to these stories is then introduced, using Brown's knowledge cultures to understand their separate but connected perspectives.

This thesis is a 'Thesis by Compilation', as per ANU policy, and is structured as a series of journal articles, which have been published, or submitted for publication at the time of thesis submission. Each article is independent, so overlap and repetition are inevitable, particularly in background information. In addition, there are formatting and citation differences due to the varying requirements of the journals. The papers are referred to in-text by their 'short names', below in brackets. These first two chapters are not intended to be a complete literature review or methods chapter as included in most 'traditional' theses. Rather they provide a methodological framework and broad context for understanding the research undertaken, and the relationships between its different aspects.

Publication list

1. Cleland, D., (2011) If Wishes Were Fishes: Hope Sustaining Action in Marine Management, *Griffith Review,* (32): 414-424 (Short name: *Hope*).
2. Cleland, D., (2017a) Viable metaphors: the art of participatory modelling for communicating sustainability science, *Knowledge Management for Development Journal,* **13**(1): 39-57 (Short name: *Viable metaphors)*
3. Cleland, D., (2017b) A playful shift: Field-based experimental games offer insight into capacity reduction in small-scale fisheries, *Ocean & Coastal Management,* **144**: 129–137 (Short name: *Playful shift*)
4. Cleland, D. and Ocaya San Jose, R., (in press) Rehearsing inclusion through fisheries stakeholder workshops in the Philippines, *Conservation and Society*. (Short name: *Rehearsing inclusion*)[2]
5. Cleland, D., (2017c). Fishing for a career: alternative livelihoods and the hardheaded art of academic failure, *Journal of Working-Class Studies* (Short name: *Fishing for a career*)

2 Co-author Raissa O'Caya-San Jose transcribed/translated/interpreted workshop videos, and commented on a draft (signed declaration in appendix).

Table 1: Research questions, answers, methods and data by paper

Short name	Research questions	Answers	Knowledge culture (type of inquiry)	Methodology & data used
1. Hope	How can I ethically justify having carried out research using computer-assisted board games in depleted reef fisheries in the Philippines? ➔	Through using a hope framework, informed by synthesizing hope literature, and postulating on the role of comedy/fantasy in creating the conditions for social change. ↙	Individual (reflective)	Autoethnography - Field notes - Embodied affective memory of nodal moments
2. Viable Metaphors	How do you design a useful game for learning and engagement for sustainability, using depleted reef fisheries as a case study? ➔	One way is to use the 'viable metaphor' approach to create a game that is suitable, playable, and recognisable. ↙	Community (dialogic)	Experiential, collective learning - Literature - Participatory scenario development - Field notes - Video data - Interviews with project staff
3. Playful shift	Can a game (designed in this way) give useful insights into alternative livelihoods and shifting out of depleted fisheries? ➔	Yes, the game provides insights that usefully complement survey and ethnographic research, while facilitating important face-to-face interaction between stakeholder groups, including researchers. ↙	Expert (empirical)	Mixed methods (observation and measurements from game) - Game decisions - Video data
4. Rehearsing inclusion	What can analysis of the game's use in stakeholder workshops tell us about creating inclusive spaces for participatory resource management? ➔	Analysis using Iris Marion Young's (2002) theory for inclusive communicative democracy demonstrates how workshops using tools like ReefGame can assist inclusive participation through creating opportunities for communicative resistance to dominant discourses, and encouraging multifaceted communication beyond 'rational argument', including story-telling, humour and improvisation. ↙	Organisational (practical/ strategic)	Abductive reasoning - Video data - Field notes - Interviews with project staff - Ethnographic vignettes
5. Fishing for a career	Was it ethical to do a PhD on fishers using games in workshops, and who benefitted from it? ➔	A diffractive account of my/the fishers' livelihood possibilities during and post PhD demonstrates neither the fishers nor I benefitted very much from this research. However, we can begin to construct an ethical framework for worldly engagement based on what has been learned and experienced through the PhD process.	Holistic (idealistic/ creative)	Diffractive inquiry - Ethnographic vignettes

Arrows between research questions and answers columns indicates they can be read as a single narrative arc.

Case study context: Why the Philippines, why fishing, why a game?

"The center of the center of marine shore fish biodiversity: the Philippine Islands"

(Carpenter and Springer, 2005)

The Philippines is part of a global epicentre of marine fish and coral reef biodiversity, known as the Coral Triangle (see below map), which provides critical ecosystem services for fishing and tourism livelihoods, coastal protection and food security (Asian Development Bank, 2014; Cruz-Trinidad *et al.*, 2014). The reefs and associated fisheries are facing the triple threat of climate change, ocean acidification and overfishing. Of these three, only overfishing can feasibly be managed locally (Pandolfi *et al.*, 2005). The Philippines has 1.4 million small-scale fishers (Perez *et al.*, 2012), a sector that has been described as the "poorest of the poor" (Muallil *et al.*, 2014). Fishers report dramatic decreases in catches, despite some 40 years of attempts by usually foreign-funded and NGO-led 'community based natural resource management' projects to implement conservation measures (Pomeroy *et al.*, 2017). Perez et al. (2012) summarise the relationship between internationally funded development projects and the state of fisheries in the Philippines as historically ineffective; "Despite eight national fisheries

plans from 1972 to 2010, four major externally funded fisheries programs and thousands of local initiatives, the failures and inadequacies in governance of small-scale fisheries are conspicuous."

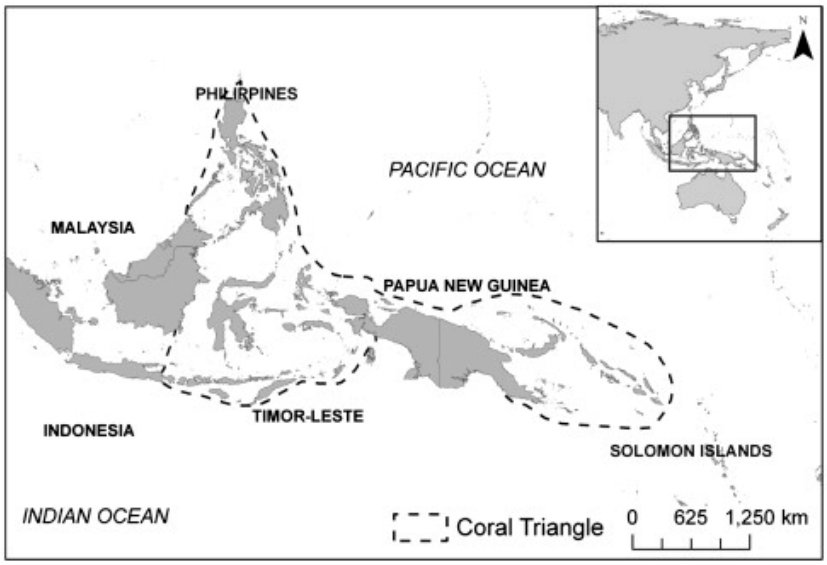


Figure 1: Map of the coral triangle region (Fidelman *et al.*, 2012)

The support of small-scale fishers is widely understood to be essential for marine conservation, as the regulatory capacity of fisheries law enforcement agencies is limited at best (Fabinyi, 2012). In the Philippines, local government units (LGUs), also known as municipal or city governments, have control over marine resources to 15km from the shoreline, encompassing all small-scale fishers and most coral reefs. LGUs are notoriously under-resourced and often struggle to effectively control illegal and destructive fishing activities, let alone carry out programs to reduce the number of legal fishers or boost conservation, even with external assistance (Aliño *et al.*, 2004; Arceo *et al.*, 2013; Bacalso and Wolff, 2014; Horigue *et al.*, 2016).

Alongside the continuing ecological deterioration of both fisheries and coral reefs has been a proliferation of computer models to explain, predict and otherwise inform human action to reverse or slow the decline (Weijerman *et al.*, 2015). Whilst robust debate occurs in the literature about whether these models are worth the considerable resources invested in them (Ravetz, 2003), there are strong reasons to argue that by synthesising and representing what we know, models can be useful in answering questions about what should be done (Boschetti *et al.*, 2013). Further, a community of practice has emerged around creating participatory models that can be used by stakeholders (Dreyer and Renn, 2011; Jones *et al.*, 2009), where 'stakeholders' is a broad term referring to the people with

an interest in the management or use of the natural resources in question (Brown, 2010a). Within multi-stakeholder forums, scholars claim that participatory models can help direct discussion, explore future scenarios, assist learning, provide insights into human behaviour and preferences, and contribute to negotiation and problem-solving over resource conflicts (Dreyer and Renn, 2011; Siebenhuner and Barth, 2005; Squires and Renn, 2011; Vieira Pak and Castillo Brieva, 2010).

Across the Coral Triangle, as in the Philippines, the bulk of coral reefs are under the purview of local managers, who do not necessarily have the expertise or resources to run or interpret data-heavy models (Maynard *et al.*, 2010). Even less so small-scale fishers, who have been virtually ignored as the audience for models, despite the fact that overfishing is a key driver of coral reef degradation (MacNeil *et al.*, 2015). Indeed, small-scale fishers have rarely, if ever, been the target audience of participatory models, despite the repeated calls to more actively involve fishers in policy discussions, management, scenario building and education activities (Cinner *et al.*, 2011; Johnson *et al.*, 2012; Lachica-Aliño *et al.*, 2006; Maypa *et al.*, 2012). Beyond models, Grorud-Colvert and colleagues (2010) emphasised the importance of science communication to successful marine management, but admitted their collaboratively designed tools were inadequate for "fishers of diverse backgrounds". Instead they recommend the development of "more appropriate methods" but leave little guidance as to what these may look like or how to develop them. In the same year, Maynard and colleagues (2010) argued that creating meaningful models means making them both "palatable" and "relevant", but also directed their efforts to managers, rather than resource users. In the Philippines, the delightfully named 'FishBe' systems dynamics model gives local managers a broad scale understanding of the need to combine protected areas with reduced fishing effort for sustainable management, but is also rather inappropriate for fishers, as it has a complicated, text-heavy interface (Licuanan *et al.*, 2006).

I began work to address this gap in decision support tools aimed at fishers before beginning my doctorate, as part of a separate project[3], and in collaboration with several other researchers. My previous research (Cleland and Wyborn, 2011; Cleland *et al.*, 2012;

3 'Modelling and Decision Support Working Group (MDS-WG)' of the Targeted Research and Capacity Building for Management Program, funded by the Global Environmental Facility (GEF) and the World Bank, www.gefcoral.org. The original fieldwork for ReefGame 1.0 was for my Honours thesis (final year of undergraduate studies). ReefGame 1.0 was co-designed with Anne Dray, Pascal Perez and Rollan Geronimo, the co-authors of Cleland et al., 2012). I had previously developed a game with Anne Dray and Pascal Perez in Mexico in 2006. The learnings of this experience are addressed in more detail in Viable Metaphor

Wyborn and Cleland, 2010) makes a methodological and ethical case for using what I interchangeably call 'quasi-experimental field games', 'participatory game-based models' and 'computer-assisted board games' for research and engagement with subsistence/small-scale fishers. It draws upon the work of other scholars, who have found that combining participatory modelling with games promotes social learning among resource users (Dray *et al.*, 2007; Jones *et al.*, 2009). These 'computer-assisted' games are explicitly focused on creating dialogue rich environments for building knowledge and creating shared understandings for conservation.

In Cleland and Wyborn[4] (2011), I briefly canvass the state-of-play in engaging with fishers in the Philippines, one that has largely not changed in the years following (as argued by Pomeroy *et al.*, 2017, and confirmed by my fieldwork experience). Namely, that for didactic purposes, fishers are invited to workshops where they are taught about ecological issues such as overfishing and marine protected areas (MPAs) through traditional classroom formats such as slide presentations. Conversely, for research purposes fishers are usually asked to participate either in focus group discussions or survey-based interviews (Muallil *et al.*, 2014; Pascoe *et al.*, 2014). Stakeholder fatigue from fishers seeing limited results after repeatedly participating in both modes has been identified by facilitators and researchers alike as far back as 2007 (Saguin, 2008; Wyborn and Cleland, 2010). Our pilot experience with ReefGame 1.0, a computer-assisted board game, confirmed that breaking with these expected rules of engagement through gameplay could assist in creating dialogue between participants, and that this offered opportunities for learning for researchers and fishers alike.

Case study history and development: ReefGame

"At the very least the sort of games I am proposing would loosen things up, get rid of preconceptions that may be standing in the investigators' way, would send them back to the evidence with a more open and intuitive understanding of that pattern of analogies that lies often enough under the confusions of mere event."

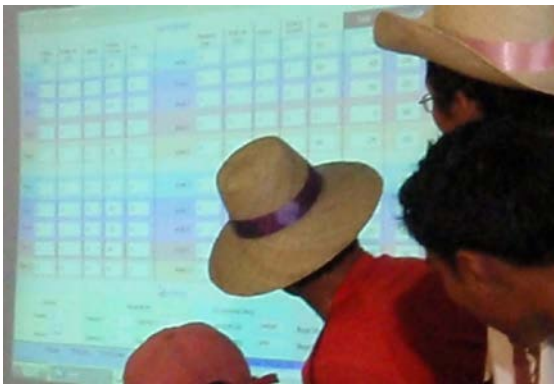
(Malouf, 1982)

ReefGame is a 'fishing game', played with a physical board representing the local coastline, and an accompanying computer model which calculates catches, income and the state of the environment (examples of the board, and players in Figure 2, below).

4 Entirely co-written and devised with Carina Wyborn, based on our respective honours fieldwork

Players need to make decisions about livelihoods and coastal resource management, through a series of increasingly complex scenarios. Instructions for the game are in Appendix 4, and the game is described more completely in *Viable metaphors* (second paper).

a) ReefGame players in El Nido



b) ReefGame "results" interface, projected for players to see.

c) ReefGame board and tokens

Figure 2 ReefGame players, board and interface

ReefGame, like all 'educational' games, is not neutral (Hoofd, 2007). While it is possible to create non-market solutions to overfishing within the game, it was designed around assumptions of capitalism – wage labour and small-scale entrepreneurialism –

rather than alternative economies (Cameron and Gibson, 2005). As game designer, I was complicit in this – my discovery of this complicity is discussed in *Hope* (first paper); and an analysis of the consequences in *Rehearsing inclusion* and *Fishing for a career* (fourth and final papers).

As introduced, we ran a pilot workshop using ReefGame 1.0 in 2007, and I used it as a pedagogical tool for undergraduate students in the years following. The two papers I wrote at the beginning of my candidatures (Cleland and Wyborn, 2011; Cleland *et al.*, 2012)[5] provide the scholarly framing and justification for further research into using game-based tools to address issues of depleted fisheries and livelihoods in the Philippines, within a critically reflective framework.

The ReefGame pilot experiment was limited in two key ways. Firstly, the scope for outcomes to impact governance or management was virtually nil, as we had not included fisheries stakeholders from industry, government or the non-government sector. Secondly, in demonstrating the game to a single small group of stakeholders in a single municipality of the Philippines (Bolinao, Pangasinan, see Figure 3, below), we were not able to make general conclusions about the adaptability of the game to different socio-economic contexts. We argued running ReefGame workshops with multi-stakeholder groups, in a variety of different social, ecological and economic settings, would help inductively "build our knowledge base and framework for action" for managing depleted fisheries (Cleland *et al.*, 2012).

Further, in addition to seeing 'novel' or lesser-used methods, such as computer-assisted models, as a useful tool in a saturated space of much research and little progress, such as Filipino small-scale fisheries, in Cleland and Wyborn (2011) I argue it is imperative to pair these methods with an iterative, reflective methodology centring a concern with ethics and the wellbeing of participants. The onus is on researchers to continuously interrogate and justify their presence in the field, given the disproportionate flow of benefits to researchers versus the risk of harm through the fishers' sacrifice of time not spent in subsistence or cash generating activities.

For now, though, we turn to the case study project through which I examine whether ReefGame could work as an ethical intervention for sustainability, inclusion and justice within fisheries stakeholder workshops across diverse sites in the Philippines

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5 Appendices 1 & 2

Case study: The FindFishSup project

"No project is an island"

(Engwall, 2003)

It was under the mandate for expanding the users and reach of ReefGame, while maintaining a critical and evaluative eye, that the David and Lucille Packard Foundation (USA) funded a project called 'Finding a way out for depleted subsistence fisheries in the Philippines' or 'FindFishSup', to redevelop the game and demonstrate it across a further eight municipalities. The sites chosen (Figure 3; Table 2) were justified on the basis of a purposive sampling strategy, as each had different potential livelihood options available for fishers based on regional economic activities. While I did not write the grant, it drew heavily from the work discussed above. In addition, FindFishSup's entanglement with the previous project heavily influenced its personnel, design and implementation (for further details see below 'Justifying Research'). As well as tool demonstration workshops, we held an initial scenario development workshop to help redevelop the game (described further in paper 2, *Viable metaphors)* and a final train-the-trainer workshop (both in Manila, see the schematic diagram below).

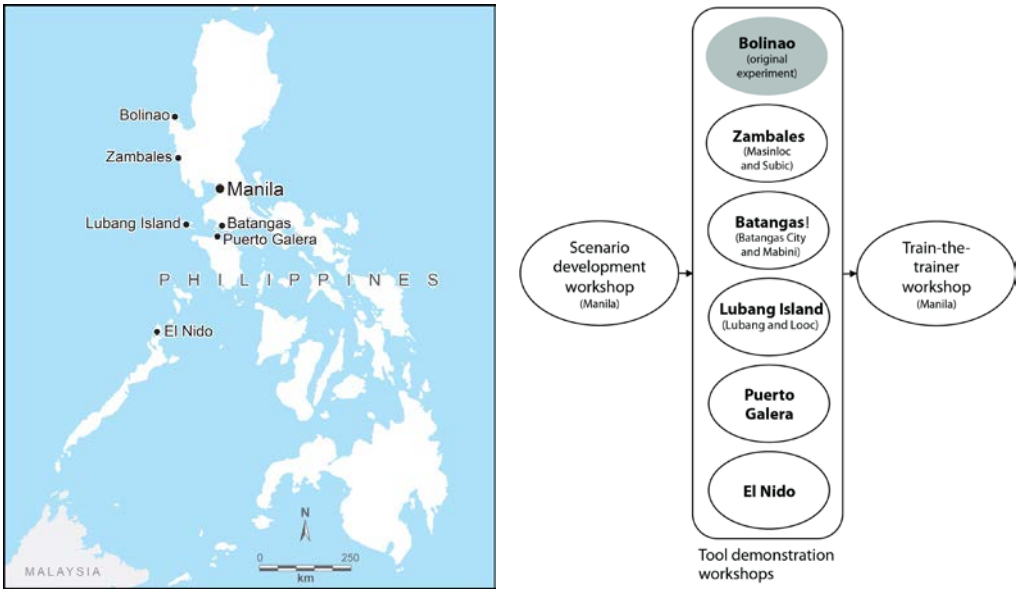

Figure 3 (L) Map of workshop locations; (R) schematic diagrams of ReefGame workshops
(map credit: Clive Hilliker)

Table 2 also contains demographic information about each site. Despite the apparent differences in population size and economic structure, fisheries in all towns are reported as suffering declining catches (Muallil *et al.*, 2013), with the fishery being largely subsistence in nature (Muallil *et al.*, 2013). In none of the towns can fishers expect to make

enough to maintain an average family without additional income, either from themselves or other family members (Muallil *et al.*, 2012). More contextual information about each site is provided in the papers, where relevant.

The game demonstrations in these sites had three aims:

1) help fisheries stakeholders learn about coral reefs, options for marine management and alternative livelihoods (the focus of paper 2, *Viable metaphors* (Cleland, 2017a));

2) provide insights into fisher behaviour in the context of depleted subsistence fisheries in the Philippines and differing socio-economic opportunities (the focus of paper 3, *Playful shift* (Cleland, 2017b)); and

3) assist dialogue across scientists, managers, NGO workers, relevant industry interests and resource users (fishers) to justly and sustainably use, share and manage marine resources (the focus of paper 4, *Rehearsing inclusion* (Cleland and Ocaya San Jose, in press)).

How well it succeeded across these three endeavours, and the trade-offs between them, is the main focus of the rest of the thesis. Alongside this, however, I explore the ethics and efficacy of representatives of metropolitan academic institutions 'playing' with poor, rural communities for the purposes of creating scholarly knowledge (the first and last paper – *Hope* and *Fishing for a career*).

Table 2: ReefGame demonstration sites: main industry, population and size of fishing community

Province	Municipality	Main industry	Population	Fisher population (% of total)
Pangasinan	Bolinao	Mariculture	74 545	5.67
Zambales	Masinloc	Industry	44 342	2.96
	Subic	Industry	89 724	1.44
Batangas	Batangas City	Industry/Tourism	305 607	0.42
	Mabini	Tourism	4 391	1.59
Lubang Island, Occidental Mindoro	Looc	Fishing	21 841	4.77
	Lubang	Agriculture	23 068	3.47
Oriental Mindoro	Puerto Galera	Tourism	32 521	0.98
Palawan	El Nido	Tourism/Fishing	36 191	9.35

(Sources: Muallil *et al.*, 2012; Philippines Statistics Authority, 2010)

During the approximately two years the FindFishSup project ran, from 2009-2011, I conducted participant observation within the project team. In this role I redesigned ReefGame from a 'fisher-only', site-specific role-play game to a multi-stakeholder game

that could be played with government, industry and NGO workers, across different sites (the differences between the original version and that which I developed for this thesis are detailed in Appendix 3). I parameterised the game for each of the workshops; attended the workshops; operated the game's accompanying computer model during game sessions while recording participants game decisions; hired a professional film crew to record the final four workshops; worked full-time in the laboratory among my Filipino colleagues and friends; participated in project meetings, debriefs and celebrations and worked on the side on several related projects undertaken by my Filipino research group.

The broader project team based out of the Marine Science Institute at the University of the Philippines, Diliman (Manila) included about a dozen people: marine scientists and a fisheries economist, graduate students acting as research assistants and workshop facilitators, a participatory coastal management specialist facilitator, and several administrative and other support staff. All were Filipino, except for myself.

Overall, I was involved in running eight workshops, with a total of 240 participants. An initial scenario development workshop helped introduce government and NGO stakeholders to the FindFishSup project and set the parameters for game redevelopment. Following, we held six two-day ReefGame demonstration workshops, and a final train-the-trainer workshop, where I trained interested participants in how to use ReefGame. Each workshop involved about 40-50 people, including local fishers, local government (LGU) and provincial officers, volunteer coast guards, industry representatives (e.g. tourism/ aquaculture), environmental NGO workers, and village officials. In the workshops, ReefGame was played in four sessions, interspersed with other activities, including a mapping exercise and presentations by other members of the project team. The focus throughout this thesis, however, is on the game sessions.

Table 3: Workshop participants by site

Workshop	Fishers	LGU	Other *	Total
Scenario development workshop (Manila)	-	29	16	45
Zambales (Subic and Masinloc)	15	7	7	29
Batangas City	18	3	2	23
Mabini	10	6	3	19
Lubang Island (Lubang and Looc)	19	6	4	29
Puerto Galera	18	4	4	26
El Nido	15	6	9	30
Train-the-trainer workshop (Manila)	1	9	29	39
TOTAL	96	70	74	240

*other includes local environmental NGO workers, industry representatives (e.g. tourism) including from corporate foundations; and for the first and last workshops students, academics and environmental consultants.

In this thesis, the FindFishSup project is a case study to reflect upon the use and usefulness of non-neutral, yet context-informed games to inform fair and sustainable small-scale fisheries management in the Philippines. My participant observation work with the FindFishSup project, then, is the basis on which I grapple with the question of how might development researchers ethically intervene in sustainability, inclusion and social justice challenges.

Scope and definitions

This thesis pivots on three holistic principles: sustainability, inclusion and social justice. Whilst definitions are a helpful way of setting scope and boundaries, I do not want to spend time on lengthy treatises. Rather than justifying a unique position within never-ending turf wars, I instead adopt a principles-based approach that allows for contestation and evolution within a participatory setting. Crucially, the three concepts cannot be thought of separately: rather, they intertwine to form the ethical platform of the work herein.

Firstly, sustainability is the principle of maintaining the "integrity of ecological life systems" such that "quality of life, now and in the future, is improved" (Brown *et al.*, 2010). This perspective places social and cultural dimensions, uses and values at the core of the practise of sustainability, and replaces a human-centric view with a life-centric one (Rigby, 2017). Just as importantly, the terms 'integrity' and 'quality' allows a plurality of evolving concepts that do not rely on static ideas of what should be maintained, nor how to achieve

this: it is socially just and inclusive processes that underpin practice within sustainability work. (Johns-Putra, 2017)

My usage of the other two core concepts draw heavily from Iris Marion Young's work, and are expanded on in detail in *Rehearsing inclusion*. Social justice is the creating the "institutional conditions for promoting self-development and self-determination of a society's members" (Young, 2002); where sustainability requires us to think beyond the human members of a society. Inclusion is the principle that those members of a society should be able to participate to create these institutional conditions for self-development and self-determination.

This emphasis on principles and processes has greatly informed my choice of literature in each paper. Note that while the subject of this thesis is 'a game' and its focus is fisheries, the quintessential commons, I largely do not draw on Eleanor Ostrom's work nor on the extended and rich literature on games theory and commons research management (See, for example, Ostrom, 2006). Instead, I focus on the ReefGame workshops as a nexus of interaction that holds potential for informing relational understandings and practices of justice and sustainability. Similarly, although the Science-Policy interface literature (See, for example, Wiek *et al.*, 2012) has much to say on the way scientists, policy-makers and community members do, could and should interact; again, I draw on other traditions, particularly the work of democracy and political theorist Iris Marion Young to inform my arguments about mutual understanding and action. The 'gaps' these literatures address - between 'games' and 'reality' and between 'science' and 'policy' are not the subject of this thesis. Both areas of literature are rich sources of insight. They are, however, not the focus here.

Engaging ethically with fishy problems: principles meet practicalities

"Let a man get up and say, 'Behold, this is the truth,' and instantly I perceive a sandy cat filching a piece of fish in the background. Look, you have forgotten the cat, I say."

(Woolf, 1931)

Thus far I have constructed an academic argument for the creation and deployment of a game-based tool (ReefGame) for dialogue in multi-stakeholder workshops, yet hinted that I had an uneasy relationship with the FindFishSup project that eventuated. This section sets up my ethical stance in relationship to these concerns; a necessary part of

transdisciplinary inquiries (Russell, 2010), and leads to the methodological philosophy that underpinned the research.

My ethical position is that interventions that seek to understand and hopefully thereby reduce ecological degradation and human poverty need to be inclusive; and that intertwining disparities in material, social, political and economic power and participation should not persist (Young, 2002). This includes research for development interventions. We should not, as researchers, enable or enact such disparities, and indeed, we should work to actively challenge and overcome them. This orientation, which lends itself to a transdisciplinary and integrated research approach (van Kerkhoff, 2014), was in many ways curtailed, mangled and otherwise stymied by working inside the structure of the short-term outreach project that was FindFishSup. These are systemic limitations felt across research, development, and research for development, rather than shortcomings in the FindFishSup project team (Saracci *et al.*, 1999; Satterthwaite, 2003). As the project went on, I also felt increasingly uncomfortable with the colonial role that I was drawn into as one of only two active white participants[6], and the control that external, non-Filipino scientists wielded over the project's personnel, design and implementation. My retrospective realisation of ReefGame's capitalist premise, and my complicity in this, also dismayed me greatly. This unease and distress is common: development ethnographies increasingly explicitly address their concerns with the way 'project logic' tends to reinscribe and support local inequalities and injustices rather than challenge them (Cleland and Ocaya San Jose, in press; Green, 2003; Narros, 2014; Peterson, 2011).

Further, as the prologue perhaps indicated, I am also reasonably sceptical of the role that 'technological tools' play in persuading humans to change their behaviours. As Cecile Jackson (Jackson, 2011; Jackson, 2012b), and others (Dray *et al.*, 2007), have explored in depth, local norms, relationships, cultures and histories tend to undermine any idea of unproblematic transfer of 'educational' games like ReefGame. I also find myself wary of how academically-orientated conservation projects often attempt to integrate the insights of social science in ways that resemble public relations/facilitation exercises more than genuine engagements in the complexities of habits, power and structures (Bennett *et al.*, 2017). This put me in an uneasy position with the FindFishSup project, as it operated under

6 The other Australian participant was contracted to rewrite a more user-friendly version ReefGame in a web browser in time to run the tool demonstration workshops. That he did not fulfil this obligation dramatically changed my role in the project (from largely observer to largely participant), is one of the "unpredictable but not random" vagaries of action/integrated research (Sundberg, 2006). Two alternative stories of why/how the project was implemented that deal with this in more detail are below.

very similar logic of assuming that awareness-enhancing technologies are key to solving sustainability problems (Cleland, 2011). I wondered what the project could achieve, given that it inevitably failed to reach its goal to "shape a new partnership between researchers, policy-makers and local communities through an iterative process of dialogue, decision and assessment" (as per the project proposal) –not least because project funds only covered a single workshop in each site. The contradictions implied here, the compromises and the disappointments are an integral part of the research. The quest to find out how the game worked for whom, and why, is within the context of being aware that the most likely beneficiaries were those in charge of its implementation (i.e. myself and project staff) (Cleland and Ocaya San Jose, in press).

However, in my search to find an institutionally acceptable and feasible way of creating the "original written work" which makes "a substantial contribution to knowledge" (ANU, 2017) and thereby complete my doctorate, I found myself distilling away much of the emotional and imperial context. This is not to say these aspects are not of academic value, but rather that I found myself unable to follow the line of deconstructive criticism without turning myself into the 'rubble' that John Braithwaite so evocatively describes when he censured the tendency of the social sciences to pull down, without building up (Braithwaite, 2004a). As David Mosse wrote, "I take responsibility for shaping the project's design, for the naivety, over-ambition, ignorance and wrong-headedness of my own contributions. I can admit these as personal failings, but also see them as prefigured by the structural and discursive conditions of a development project" (Mosse, 2006). In this case, the preconfiguring conditions are how philanthropic organisations based in developed countries determine 'what gets done' in developing ones, the preference of the same for technical fixes to complex social problems, the project format with time–and space-bounded deliverables (Green, 2009; Satterthwaite, 2003), and the associated dissociation between the researcher and the participants (and all those who never got to 'participate') (Peterson, 2011). These are all the subject of vast swathes of critical literature, including that of the so-called 'science-policy interface' (Wiek *et al.*, 2012) and 'neoliberal conservation' (Büscher *et al.*, 2012). I have not foregrounded these structural conditions, nor this literature, in the papers that make up the bulk of the thesis. Rather, I wanted to follow the kernel of hope in a framework of failure, by looking for what Iris Marion Young calls the "possibilities glimmering" (Young, 2002). The structural limitation of the project, and its inability to make any material difference in the lives of the subsistence fishers we purported to help, is nevertheless the backdrop against which I wrote these contributions.

How I justify integrating these somewhat incompatible perspectives through my research design is the subject of the second half of this introduction. First, however, I turn to two final justifications for my research project, drawn from the 'community' and 'institutional' knowledge cultures, introduced above.

Justifying research: a transdisciplinary approach

Displacing 'the literature' as the primary means of justifying a research project, and placing equal attention to the other knowledge cultures, should be a core strategy to both create *and defend* transdisciplinary research. The traditional 'literature review' can be understood as the expert knowledge culture's means of justifying action: by identifying a 'gap', one creates a warrant to do research, as we saw in the introduction to the FindFishSup case study. It is common, particularly in a thesis, to extend this justification in two directions. Firstly, by linking the research with holistic goals, such as justice, sustainability and inclusion, as I have in the section above. Holistic goals are a necessary feature of transdisciplinary projects, but are not unique to them. Secondly, citing individual interests and history, which I briefly canvassed in giving the background to ReefGame's development. Within Brown's knowledge cultures, this leaves the community and organisational mandates. These are usually ignored or downplayed - even Brown does not address this aspect of research mandates. Here I present two alternative stories of *why* the FindFishSup project took place through these two final lenses.

Organisational mandate: cross-scale survival

"Organisational knowledge is widely regarded as self-serving."

(Brown, 2008)

"There's no money in science anymore but if you do livelihoods you can earn a grand a day"

(Rajak and Stirrat, 2011)

As introduced above, an 'expert' mandate for action constructs a gap from disciplinary literature to justify focus on a particular problem. In contrast, organisational, or institutional priorities centre on ensuring their survival through strategically activating the resources they have at hand (Brown, 2010b). This is why allegiances, agendas and networks play a fundamental role in organisational knowledge cultures – it is about mobilising to achieve their primary goal of continuity of existence. For the same reason,

organisational knowledge is dismissed as being based in 'deals, mates and corruption' (Brown, 2004), that is, for seemingly preferentially receiving resources or 'succeeding' through leveraging networks. This is an underplayed reality of research projects: often the 'gaps' are constructed as being able to be filled within the skillset of already existing alliances of researchers.

FindFishSup was funded through an American philanthropic organisation, for a grant written largely by Australians and implemented by a marine resources foundation attached to an academic institute in the Philippines. This set up affected every element of the project's execution, including my own role as a white Australian PhD student.

By looking beyond the FindFishSup project and its organisational antecedents, I want to render visible the broader forces of power, institutions and funding patterns that shape short-term activities – like this project – and, in doing so, shape the long-term trajectories of knowledge and decision-making.

Consultants and scientists follow funding trails as science is increasingly commodified in a global knowledge economy (Rajak and Stirrat, 2011). The commodification of science has not so much changed the fundamental goal of science institutions to survive (without survival, they can conduct no science), but rather redirected its material and energy flows along different paths (Drahos, 2017). The example of ReefGame illustrates this in several illuminating ways.

The original deployment of ReefGame in 2007 had been done under the auspices of the CRTR project's Modelling and Decision Support (MDS) working group, tasked with developing tools to assist the scientific management of reefs. Originally, CRTR was designed to last 15 years, divided into three five-year phases, funded by both the Global Environment Facility (GEF) and the World Bank. Due to the replenishment of GEF's funds, which was to occur around the end of 2009, and the failure of the CRTR's steering committee to convince the World Bank that the project was sufficiently attending to the Bank's stated core objective of reducing poverty (Bradbury pers. comm, July 2008), second phase funding looked certain to not come through in time to guarantee continuity of work for the MDS working group members.

FindFishSup was designed to bridge the funding gap created by the delays (and eventual redirection) of the project that funded CRTR's second round funding by enabling further work and dissemination of the 'knowledge products' of the project, through

securing the funding being offered by the Packard Foundation through their EBM Tools Network by designing a project that suited the call for proposals

The EBM Tools Network called for proposals to demonstrate already existing tools that support ecosystem-based management (EBM). EBM is an explicitly 'scientific' approach that nevertheless has a strong focus on integrating social and conservation values into environmental decision-making. The original call for proposals referenced the vast, yet underused EBM tools available for free online. Hence, creators were granted funds to 'demonstrate' their tools and thus improve their uptake by those actually managing the ecosystems in question. Underpinning this schema are three key assumptions: 1) using technological tools will improve the scientific management of ecosystems and 2) a reason people are not using the existing tools is that they don't know about them, and, therefore 3) managers and decision-makers would use the tools if they did know about them. The logical corollary is that once managers know about the tools, the scientific management of the ecosystem will improve.

To succeed, then, the project need only demonstrate that managers know about tools, like ReefGame, where they did not before. The project team proposed to do this by firstly consulting stakeholders in a scenario development workshop as to how to redevelop ReefGame for the field sites, holding two-day multistakeholder workshops in these sites, and then a final 'train-the-trainer' workshop in Manila (figure below)

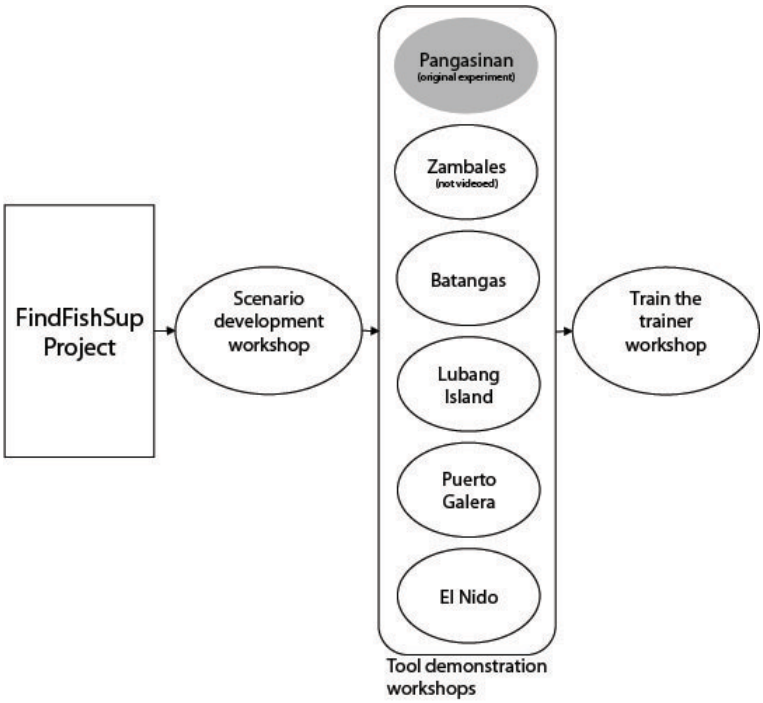

Figure 4: Schematic diagram of key project activities

As it turned out, the project succeeded in the second aim of securing the Packard Foundation funding, but it failed to provide organisational continuity for MDS members. When a much smaller Phase Two project was announced in 2012, most modelling and socio-economic research expertise was sourced from other individuals. To my knowledge, none of the MDS leadership group are now working on modelling for coral reefs: a loss of continuity meant the death of the network in this context.

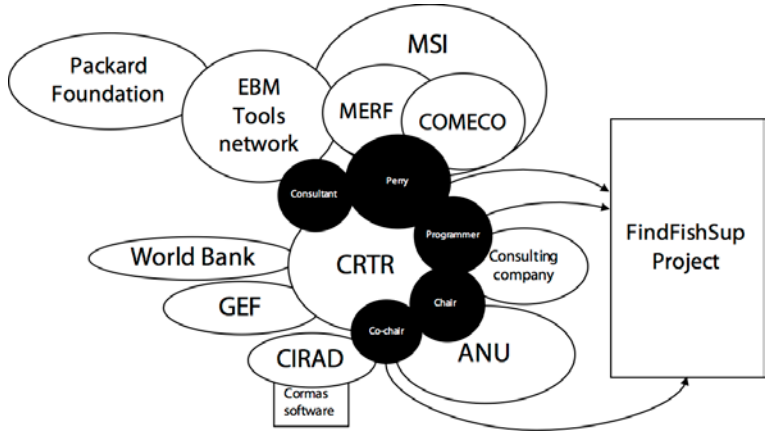

Figure 2: International networks shaping the FindFishSup project

GEF: Global Environment Facility; MSI: Marine Science Institute; CIRAD: International Centre for Research and Development (for acronym in French); MERF: Marine Environment and Resources Foundation; COMECO: Community Ecology Laboratory; CRTR: Coral Reef Targeted Research Program. Individuals have black backgrounds.

The above figure shows how international networks shaped the design of the FindFishSup in ways that were deeply influential, but invisible at the points of contact with 'local' (ie Filipino) stakeholders through the workshops held by the project. Acronyms are spelt out in the caption. The black circles are the group of male leaders of the CRTR/MDS working group (there were no female leaders). I have chosen to only identify Dr Porfirio "Perry" Aliño, as he is named throughout my thesis. 'Consultant' was a member of the CRTR steering committee, and then led the selection process for the EBM Tools network grant round – this is how MDS leaders were made aware of the funding round. Dr Aliño is a marine ecology professor at MSI, within which the 'Marine Environment Resources Foundation' operates and is eligible to receive a range of grants that academic institutions are not. 'Programmer' is a computer programmer, joint director of a consulting company with the Chair of the MDS, and hired to redesign the game in a browser-compatible format[7]. Co-chair was employed in the same faculty at ANU as Chair, but was co-employed, at the time, by CIRAD, the French Agricultural Development

[7] This work was never completed, which is why I became responsible for redesigning ReefGame for use in the project.

Agency. CIRAD developed the software tool CORMAS, and had created a network of mostly French researchers, mostly in developing nations, using participatory models and role-play games to address common pool resource conflict. ReefGame, in turn, was written in CORMAS.

None of the above information is intended to serve in this context as personal criticism or judgment, or imply that the work done was unnecessary. Rather, it demonstrates how international "conservation for development" funding flows down the channels of established networks, entangling organisational goals and personal allegiances, interests and skills, with the activities then undertaken. The tool we used (ReefGame, a game-model programmed in Cormas software), and its association flowed out from particular material, disciplinary and colonial patterns of interaction originating in France, not just because there was a 'gap' in the theory and practise of using games as resource management tools. Indeed, the original funding for knowledge products for helping manage coral reefs in developing countries, which resulted in the first version of ReefGame, flowed from the World Bank's change in orientation from a 'lending' bank to a 'knowledge' bank. This was, in part, a result of the backlash against the Bank from activists and academics following the Bank's structural adjustment programs in the 1980s (Broad, 2007). The Packard Foundation's interest and influence in the dissemination of similar products is harder to single out, although their role in performing as a market adjudicator in competitive grant processes for scientists is well-established (Blue Earth Consultants, 2010). We can ask ourselves whether corporate foundations investing in ecosystem-based management research have an eye to 'buying' themselves responsiveness in the face of exponential growth patterns that threaten the survival of capitalism through undermining the life support systems that enable it (Drahos, 2017), but this is a discussion that is well outside the scope of this short foray into global science and philanthropy.

Through establishing the organisational/institutional 'mandate to action' at a global scale, I hope to convey both the structural limits of the project and how it 'fits' in with ongoing "conservation for development" work being carried out.

This web of relationships was deeply influential in why and how the FindFishSup was initiated, but was spatially and logistically removed from its implementation. How creating opportunities to strengthen place-based relationships through the 'temporary community' created by project activities guided both planning and carrying out the project is the subject of the next section.

Community mandate: creating and maintaining governance /science relationships

"Community knowledge is generated wherever groups of individuals share the same experiences, interests and/or place."

Brown 2008

A second 'mandate for action' was to marshal resources for continuing to invest in place-based relationships between Filipino scientists and local area managers through 'temporary communities'. Management literature often describes projects as temporary organisations, pointing to their structures as being contingent and transient (Packendorff and Lindgren, 2014). However, for the purposes of introducing the community context of this doctorate, we will understand projects as creating temporary *communities* within Brown's framework. Brown described communities as place-based groups of people, who create knowledge based on stories, shared experience and dialogue. Each workshop created a 'temporary community' of participants over two days, consisting of a group of approximately 40 people, including Manila-based marine scientists and graduate students, coast management specialists, fishers, local government and village officials

The reliance on 'conservation for development' project-based funding to carry out Filipino marine science can be understood as a workaround for the paucity of pure science funding in the Philippines. While globally scientists perhaps universally bemoan a lack of funding, particularly long-term funding (Saracci *et al.*, 1999), lower-middle income countries like the Philippines are characterised by both a relative and absolute lack of investment in research in comparison to richer countries (van Kerkhoff, 2010). It is little wonder then that funding flows to MSI often have international origins, even when they come through national agencies such as the Department of Environment and the Department of Science and Technology, as is relatively common. These projects, like FindFishSup are typically short-term, and have a range of conservation, participation and development orientated objectives, notwithstanding MSI's primary role as a research institute. And so, the quote in the previous section about 'livelihoods earning you a grand a day' becomes less cynical opportunism and more pragmatic realism.

In theory, short term projects destabilise opportunities for establishing enduring science-government relationships, creating the well-documented neutral or negative effects of the fly-in-fly-out or "parachute" nature of short-term aid and research projects (Gurney *et al.*, 2014; Harris, 2004). Dr Perry, and others like him, manoeuvre around this

cycle of boom and bust by weaving together disparate pools of funding to create contiguity and longevity in their research and engagement in particular communities.

The figure below is similar to the one presented in the section above. What is different here is that FindFishSup can be considered as just one of an array of projects that existed before, during and after my fieldwork. All projects require COMECO students and/or staff to visit the field locations listed on the far right, most often for at least a few days at a time. At a minimum, the local government unit is visited as a courtesy, but more often workshops and other planned activities mean extended face-to-face time with barangay (village) officials and local government workers in the areas of fisheries and natural resource management. When viewed as an interlocking landscape of repeated site visits rather than 'one-off' project activities, each project is a mechanism to build reciprocal relationships of trust between marine scientists and the government workers charged with the practical responsibilities of regulating ocean use.

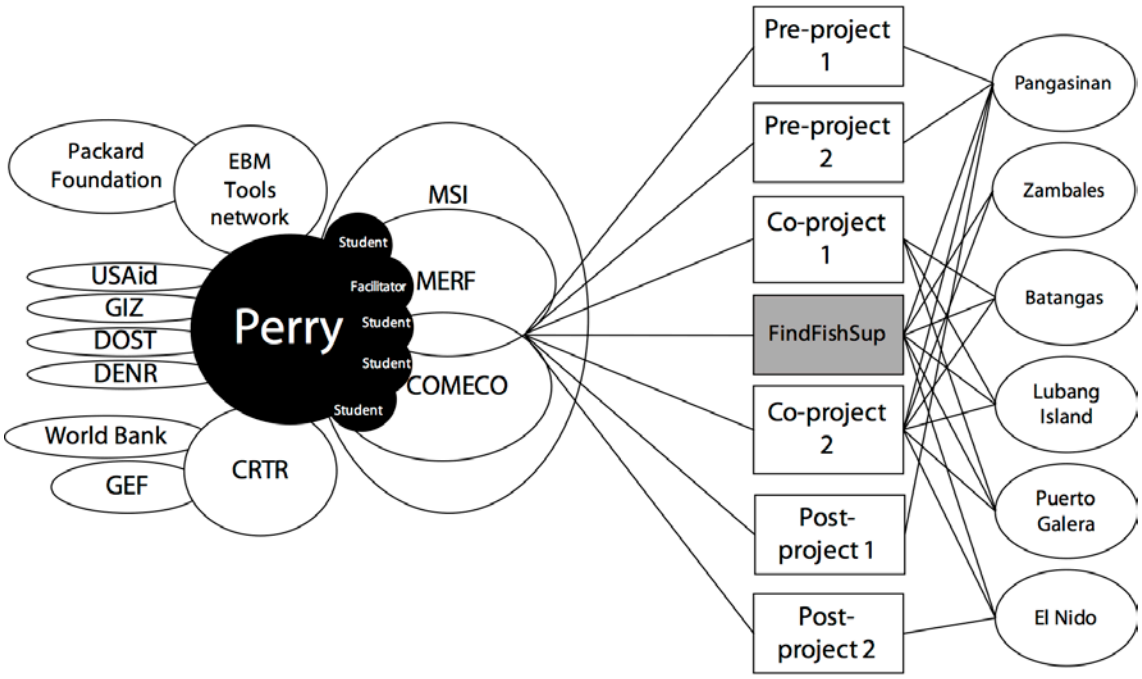

Figure 4: FindFishSup as a node in a 'chain of ponds' of short-term projects

In addition, participation in MSI-led projects brings a range of benefits to LGU workers. For example, as with FindFishSup, funded trips to Manila to participate in national professional development and networking workshops are common 'perks' of being chosen as a field site. This, in turn, helps create relationships between academics,

local marine managers and bureaucrats working for the national agency, facilitating a cross-scale exchange of knowledge and experiences that would otherwise be rare.

Notwithstanding the above claims, donors like the Packard Foundation are highly unlikely to fund a project with the stated objectives of 'facilitating face to face meetings between scientific organisations and their chosen recipient communities'. Much like the proverbial 'networking' benefits of conferences, where participants consistently point to the informal communication over morning teas as the most valuable aspect of scientific meetings, nobody will attend a conference where the only scheduled activities are mealtimes. A project lends structure and legitimacy to a performed set of public interactions that have a range of non-trivial benefits for the actors involved, and FindFishSup was no exception to this.

Summary

To recap: the first half of this introduction has established why playing games in the Philippines was thought to be a valid and useful way to improve understanding, collaboration and action around depleted subsistence fisheries in the Philippines, with some significant ethical provisos. I also canvassed ReefGame's original incarnation as a 'learning and data-gathering' game' (Cleland *et al.*, 2012), and its subsequent redeployment as part of the 'FindFishSup' tool demonstration project for multi-stakeholder workshops., Through introducing the organisational and community 'mandates for action' further on the what, how and why of the FindFishSup project. This has very little to do with the 'gap in knowledge' that a literature review constructs. Instead it provides critical scaffolding for both the rationale and the potential impact and limitations of project activities. Through this background, some of the tensions between ideals and practicalities of working within the FindFishSup project have surfaced, thereby introducing the need for a central focus on ethics and integration in research design. How this manifested in both a research philosophy and practice is what we turn to next.

Research Design

"And what is a research programme other than a somewhat systematised way of playing?"

(Jasanoff, 2014)

The guiding principles and history shaping the methodology and chosen methods will be fleshed out and contextualised in this section. The focus is on the meta-methodology of open transdisciplinary inquiry (Russell, 2010), and the construction of an autoethnographic lens using Brown's five knowledge cultures (Brown, 2010b). I then further introduce the five papers that correspond to each of the lenses. As the papers either have their own methods sections or a preface explaining the approach, methods are only briefly dealt with here.

Overall methodological framework: open transdisciplinary inquiry.

"Discipline-bounded analysis is simply a poor fit for complex systems and situations"

(McGowan et al., 2014)

I chose open transdisciplinary inquiry as the methodology for this research for a range of interrelating theoretical, philosophical, practical and historical reasons. Firstly, it was the paradigm under which this research had originally emerged and the initial steps were carried out (described above and further in Appendices 1 and 2). Secondly, the collaborative and applied nature of the FindFishSup project meant that it was essential to incorporate the "values, knowledge, know-how and expertise" (Polk, 2014) of both my colleagues (academic and non-academic) and workshop attendees. In my position as researcher and coordinator I needed to be able to be responsive to new understandings, and take perspectives that explicitly recognised, valued and incorporated the knowledge of not only different disciplines, but also the knowledge of the local governments, NGOs and fishers we were working with. Thus, I needed a transdisciplinary framework that was open, responsive and evolving (van Kerkhoff, 2014). Note that the transdisciplinary methodology literature identifies problem focus, stakeholder engagement and responsive lines of enquiry as methodological characteristics to deploy, rather than reasons to adopt a transdisciplinary approach: here, conversely, the context led the decision (Wickson *et al.*, 2006). That is, these characteristics were a given, rather than a choice.

Brown and colleagues introduce open, transdisciplinary inquiry in the book Tackling Wicked Problems through the Transdisciplinary Imagination (2010), in which Wyborn and Cleland (2010) appeared. The methodology comprises three key pillars, namely:

1. An ontology of humans reshaping the bio-physical world of which they are inseparably part and vice versa, and of which only partial and provisional knowledge is possible;
2. An open epistemology that identifies, values and integrates five overlapping and contradictory knowledge cultures – individual, community, organisational, expert and holistic (elaborated further below). Within this, Brown highlights the necessity of an iterative framework that is capable of bringing together the knowledge cultures in a way that increases understanding and creates opportunities for collective learning and action; and
3. An ethical commitment to contributing to social and environmental justice and democratic principles of inclusion and participation, and being transparent as to the values, knowledge and assumptions that underpin the researcher's normative conception of what a just and sustainable society looks like, and how such a transformation should take place.

I have addressed my ethical stance and normative commitment to the principles of participation, justice and sustainability above. Following, I introduce Brown's knowledge cultures, which is what distinguishes open transdisciplinary inquiry from the broader transdisciplinary literature. I go on to make a few comments about how working in a team affected the practical implementation of the open transdisciplinary pillars. Following this 'practice v theory' format, I then describe an idealised iterative framework, the 'critical learning spiral', which was intended to guide my research actions to further 'collective learning' through the FindFishSup workshops. I compare the 'critical learning spiral' to what eventuated in practice, through an autoethnographic description of my "research journey" (McGowan *et al.*, 2014), before returning to how integrating the knowledge cultures drove how I wrote up the results of my fieldwork.

The five knowledge cultures: an epistemology for transdisciplinarity

"The world is like a Mask dancing. If you want to see it well, you do not stand in one place."

(Achebe, 1986)

In working with different community groups towards sustainability, Brown has consistently identified five knowledge cultures that correspond to radically different ways of constructing knowledge (Brown, 2001; Brown, 2004; Brown, 2008; Brown, 2010b). They are: individual, community, expert, organisational and holistic. According to Brown, each

knowledge culture seeks to know the world in different ways, accept different sorts of evidence and is dismissed by the other knowledge cultures on different terms (Table 3). Ideally the knowledge cultures act as a nested system, wherein all are acknowledged and accommodated to create both a synoptic (all together) and synergistic (more than any single vision) understanding (Brown, 2010b).

Table 4: Brown's knowledge cultures

Knowledge culture	Symbol	What?	Evidence	Dismissal
Individual		Personal lived experience Reflections and learning	Memory Emotions Values	Subjective Limited Vague
Community		Mutual place-based experience Stories Events	Stories Shared lived experience Dialogue	Gossip Anecdote
Expert		Academic disciplines Case studies Experiments	Measurement Observation	Jargon Irrelevant Inaccurate
Organisational		Strategy Agendas Cost/benefit	Will it work? Progress towards goals Networks	Self-serving Mates Corruption
Holistic		Symbols Metaphors Ideals/visions Core of the matter A common purpose	Meaning Creative leaps	Airy-fairy Impossible Impractical

Sources: an amalgamation of Brown (2001; 2004; 2008; 2010b; 2010c). Note Brown acknowledges an intellectual debt to Kuhn (1970). Brown also uses: local as synonymous with community; disciplinary and specialised as synonymous with expert; and institutional and strategic and synonymous with organisational (see Figure 4, below)

According to Brown (2010b), each of these knowledge cultures has been shown to have its own language, approved body of content and accepted test for reliability. Briefly, individual knowledge is constructed from personal experience – reflection, memory and feelings – 'I know because I feel, I remember and I think'. Community and local knowledge is created through place-based dialogue and story – 'we know what happens around here and why'. Expert/disciplinary is how professionals and academics use measurement and observation to determine what is known, and what they accept as 'true'. Organisational/institutional knowledge asks if it *works* (and if not, why not?), with an eye to structures, relationships and resources that will ensure their agenda – including their

own survival at times. Holistic and creative knowledge is the realm of the imagination and the idealistic – dreams of justice, sustainability and democracy.

Brown (2004) represents the knowledges as a mandala (Figure 4). She explains that depending on context, there are possibilities for conflict, competition and cooperation between them, but they should not be considered as a hierarchy. Each sub-culture commonly rejects the contributions of the others, dismissing them as anecdote, gossip, jargon, self-serving and airy-fairy, respectively (Brown, 2010b). She argues that in any group-learning process, acknowledging each of these social constructions of knowledge allows for members of each sub-culture to hear each other, and recognise the strengths (and weaknesses) of other perspectives.

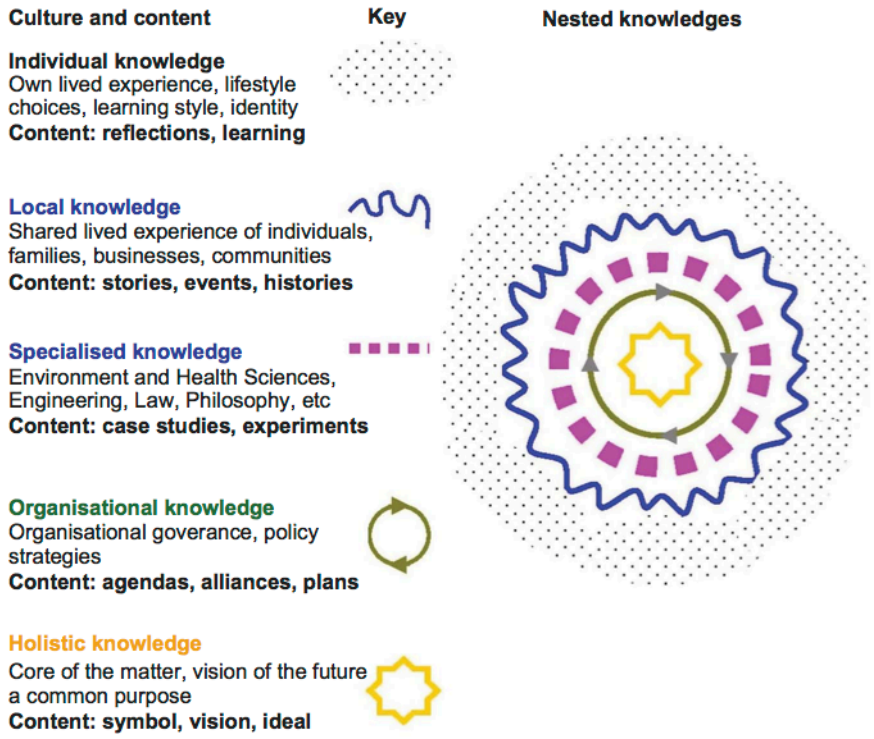

Figure 5 Brown's knowledge culture mandala (Brown, 2010a)
Note specialised is synonymous with expert, and local synonymous with community, as per Table 4, above.

Each knowledge culture has a fundamental contribution to make in understanding and improving human-environment relationships. It is for this reason that transdisciplinary inquiries must strive to include all knowledge cultures, through integrating their unique perspectives and bringing the insights together to create new visions and ways of acting in the world (Brown, 2008). Brown argues that although individuals tend to privilege particular knowledge cultures depending on contexts, all are present in every individual. Crucially, Brown (2010b) insisted that it is possible for a single researcher to conduct an open transdisciplinary inquiry, through bringing together an

"eclectic range of methods" and "diverse informants" through iterative "learning cycles". This gives the methodological justification to create an autoethnographic account of a transdisciplinary research journey (McGowan *et al.*, 2014). The next section expounds some of the practical barriers to adhering to transdisciplinary ideals in a project setting, and how I navigated these. I then introduce how I attempted to follow "learning cycles" with my "diverse informants". Finally, I return to the knowledge cultures to explain how I transformed Brown's framework from one that explains collective interactions into one that can explain a single experience in five ways as a modified autoethnography in order to create a single body of work for this thesis.

Open transdisciplinarity in practice

"Yes, but is it research[?]"

(Donmoyer, 1993)

When working in a transdisciplinary team and setting, the need to compromise between goals, ethics and methods is constant (Felt *et al.*, 2016). Inside the complex environment of the FindFishSup project, I (like everybody else) had little autonomous control, and it was apparent that shifts in focus would not only 'emerge' from new understandings but be forced by the practical fact of cooperative and respectful collegiality (Thompson *et al.*, 2017). Congruity between project goals and research (doctoral goals) were not fixed, bounded or straightforward, but rather contingent and contradictory; and evolved non-linearly over the life of the project. How this (in)congruity in goals played out to impact both project implementation and data collection is illustrated in the following examples. These trade-offs represent how I navigated interpreting and applying the ideals of open transdisciplinary inquiry in practise.

Firstly, philosophically, the marine scientists in my team, including the graduate students, thought it was important to impart the content of their scientific knowledge about Philippines coral ecosystems through traditional didactic mechanisms such as PowerPoint slides during the workshops. The standpoint here is that 'knowledge can be transferred through speech', that this transfer will result in changed understandings and behaviours by the listeners, and is therefore a critical part of social transformation. This use of empirical knowledge to inform and persuade is very much the way of the expert/disciplinary knowledge culture (Brown, 2010a). An ethnographic vignette at the beginning of *Rehearsing inclusion* tells the results of this from my deeply sceptical

position, and highlights the extent to which project decisions occurred outside of my control and had flow on effects for the 'fit' of the project with my methodology.

From an entirely different perspective, the film crew videoing the workshops considered it an ethical necessity to allow the participants to 'see' themselves on screen after being videoed incessantly for two days. This meant that time between sessions, and immediately following the workshop, was spent frantically editing together a short film that could be shown to participants in the closing session, rather than interviewing the participants, as was originally planned. Therefore, the only one-on-one interviews with participants I have are an ad-hoc collection largely drawn from 'before' the workshop, and almost none reflecting on the process of the workshop itself. These therefore did not form part of the substantive data contributing to the thesis. However, the participants thoroughly enjoyed seeing themselves in the videos, and usually asked for copies to take home to their families. This has a value that is difficult to quantify in a scholarly sense, rather, it is felt with the bones (Trigger *et al.*, 2012).

Further, it is usually considered central to transdisciplinarity that activities be co-owned and co-designed by the stakeholders involved (Benham and Daniell, 2016; Felt *et al.*, 2016). As described in the previous discussion about the inception and design of the project, this was far from the case in FindFishSup, setting up a context in which it would be difficult for the knowledge cultures to be treated equally (Brown, 2010c). Moreover, with only one workshop in each place, and with the prefabricated end goal of demonstrating an already existing tool, it is in many ways entirely incongruent to adopt an open, evolving methodology. Indeed, transdisciplinarity's requirement for flexibility, adaptability and openness has an uneasy relationship with the institutional expectations of rigour and donor demands to meet predetermined goals found in research and development projects alike (Russell *et al.*, 2008; Satterthwaite, 2003). Recognising this, the literature consistently points to tensions between entrenched practices, both inside and outside research institutions, and transdisciplinary values (Brown, 2010c; Felt *et al.*, 2016; Russell *et al.*, 2008). In organisational settings that require speed, clear goals, respect for hierarchy and status within short term projects, it is perhaps inevitable that collaboration, openness, slow and deliberate building of trust and relationships, power-sharing and evolving aims are compromised (Mountz *et al.*, 2015; Thompson *et al.*, 2017). And so, our project was, in many ways, an ordinary example of the paradoxes of attempting to occupy this aspirational space. How I attempted to carry out open transdisciplinary ideals through the life of the project, is what we turn to next.

The Critical Learning Spiral: five steps to success?

"The researcher follows a path laid out by the evidence as it emerges."

(McGowan, 2014)

In order to give structure to the relatively esoteric and open-ended nature of transdisciplinary inquiry, Brown uses what she calls the 'collective learning cycle', which is a framework for bringing the knowledge cultures together (Brown, 2004; Brown, 2010c; Keen *et al.*, 2005). This contrasts with other transdisciplinary approaches, which tend to incorporate broad methodological principles, rather than process-based models (Polk, 2014; Wickson *et al.*, 2006). Brown's version has four steps from problem definition to action: diagnose (what is?), design (what could be?), do (what can be?) and develop (what next?). For this research, I adapted her cycle slightly to form a 'critical learning spiral' (Figure 6). This meant adding an extra step "decide" (what methods?) to accommodate and highlight the need for ongoing decision making about the tools and techniques to use to take the next step (McGowan *et al.*, 2014).

My additional step ("decide") has the normative effect of underscoring the impact of 'method choice' on research design. Methods do not only shape what we can see and how we see it, but also make a difference to what matters and how events unfold. Whilst transdisciplinary research does tend towards methodological pluralism (in both approach and techniques), this step in my approach makes my exclusions explicit as well as my inclusions. As Karen Barad wrote: "our ability to understand the world hinges on our taking account of the fact that our knowledge making practices are material enactments that contribute to, and are part of, the phenomena we describe" (Barad, 2007). It is not a simple matter of objectivity versus subjectivity, but rather a concrete, ontological claim that there is an indeterminate (i.e. unknowable) relationship between how the world unfolded because I was there, using my entangled instruments of measurement and observation (eyes, body, game, computer), and how it would have under any other configuration. This close, ethical attention to how I 'cut' –made decisions about what would and would not matter through my knowledge making practices –shaped not only my field work but the entire process of writing this thesis.

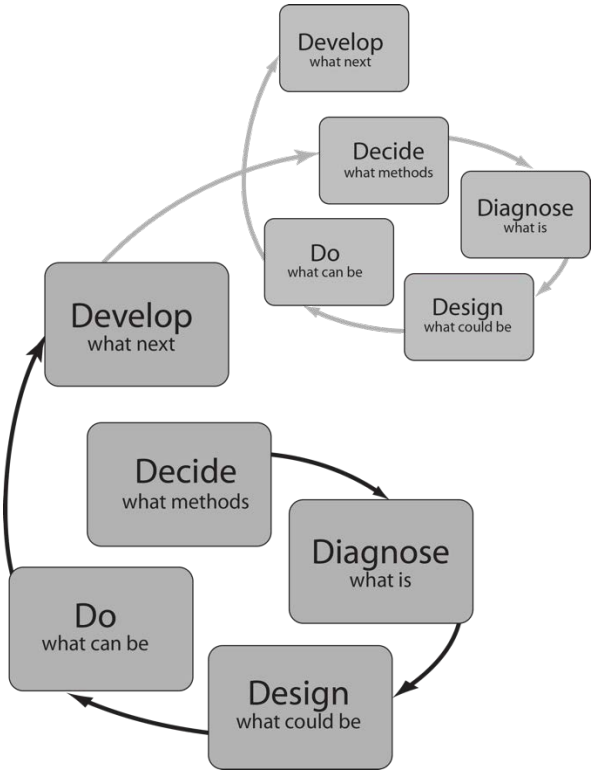

Figure 6: Critical learning spiral in theory

Belief in the importance of learning from prior experience is central to this step-wise, iterative approach. The central premise is that concepts and lessons can be extracted from a particular situation and made more widely applicable, through looking beyond the idiosyncrasies of people and place to structural features that are common across different contexts. There is nothing particularly unique about this: an enormous body of case study research speaks to social science's faith that the specific has something to say about the general (Losoncz, 2017). Adopting an iterative approach offers the opportunity to test these ideas in practice, by creating a critical learning spiral, where each successive action/learning cycle hopefully builds on the previous. Specifically, I sought to iteratively develop the game in response to the issues that arose through the workshops. In this way, I saw each workshop as an opportunity for checking my understandings to date, and co-producing a deeper and more contextual understanding in conjunction with all participants.

In practice, there is an inherent tension between a schematic stepwise approach, where learning is approximately equated with improvement, and a transdisciplinary understanding of reality as complex, nonlinear and unpredictable (García-Barrios *et al.*, 2015; Parkes *et al.*, 2005; Vieira Pak and Castillo Brieva, 2010). Further, any attempt, however humble, to disrupt disciplinary and hierarchical practices is liable to run into

problems of 'unhappy performativity' –i.e. failure (Ahmed, 2006) –where to state an intention and an ethos is not the realisation of it. The weakness of transdisciplinary approaches is precisely the strength of disciplinary research: the repetition of standard conventions and the prior authorization of its methods create disciplinary research's categorical power (Ahmed, 2006).

Disciplinary research occupies space: it has weight in the academy; it displaces that which does not follow its grooves. It is no accident that transdisciplinary research projects are described as "swamped by communication problems and disciplinary clashes, are extremely time and resource consuming, and seldom live up to the expectations placed upon [them]" (Polk, 2014). As Ahmed (2017) points out, merely to stop in a flow is to exert energy: how much more to swim against it? This is why academic journals that claim to be 'multidisciplinary' can reject papers on the basis of them 'lacking disciplinary approach' (see the introduction to the second paper, *Viable metaphors*). With these tensions in mind, how my critical learning spiral eventuated 'in practice' is the subject of the next section.

The Critical Learning Spiral in practice

"When you fall, make it part of the dance"

(Corpus, 2014)

The following section provides a description of my "research journey" (McGowan *et al.*, 2014), comparing and contrasting it with the schematic steps of the idealised 'critical learning spiral', interspersed with a sample ethnographic vignette from my fieldwork (Saldaña, 2015). McGowan and colleagues (2014) describe research journeys as "more than accidental", an adaptive "methodological necessity" in transdisiplinary research, encouraging researchers to autoethnographically unpack the way they make their decisions as circumstances evolve. As is evident from Figure 7, the critical learning loop did not maintain its structural integrity when exposed to the vagaries of cross-cultural fieldwork in the science-conservation-development nexus that was the FindFishSup project. What happened, and how this has shaped the contents of the thesis, follows.

Figure 6 is the critical learning spiral as it actually happened: The initial critical learning loop was undertaken in 2006-2007, along with my initial work to create ReefGame 1.0, and prior to beginning my doctoral thesis. Following the theory, initial forays into different field-based experimental games in Mexico in 2006 resulted in a successful

'learning and engagement' experience using ReefGame 1.0 in the Philippines in 2007. As introduced earlier, the results of this work are written up in Appendices 1 and 2[8].

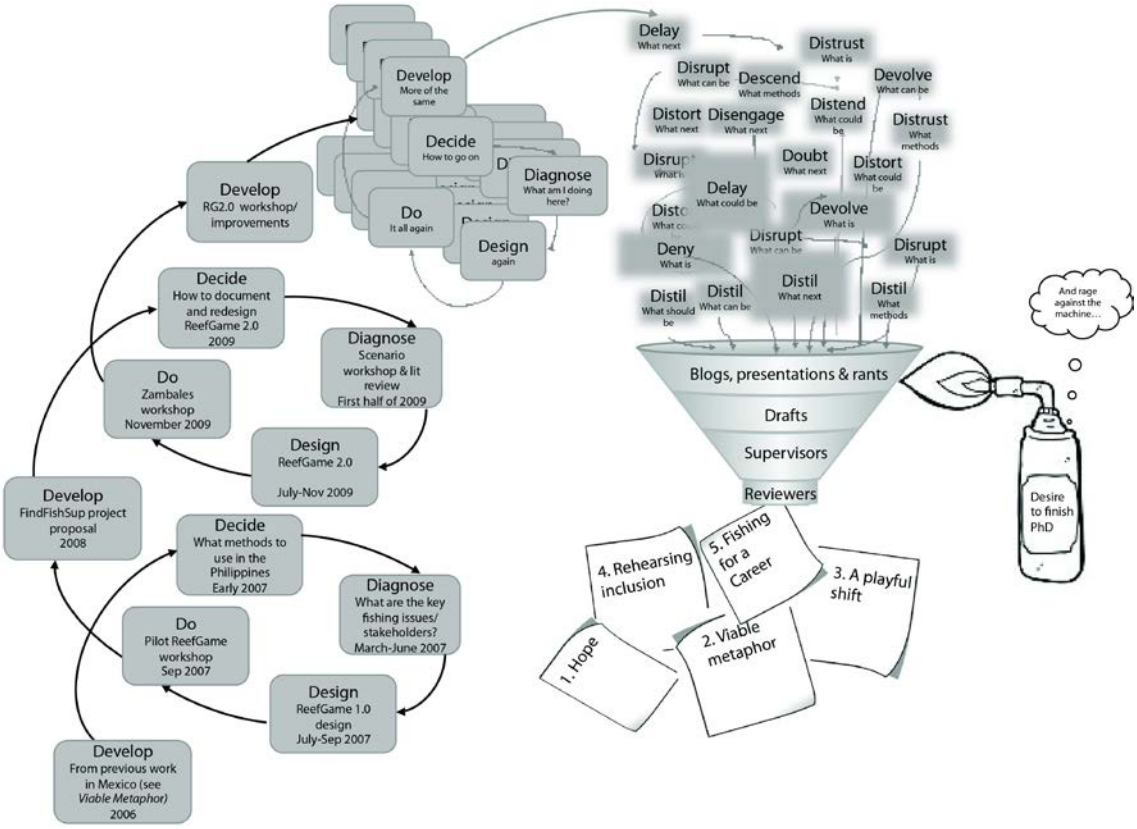

Figure 7: Critical learning spiral in practice

The second loop also went almost as planned. As I started my PhD I needed to decide how to go forward with the game design. The scenario workshop in Manila, and a literature review, helped form a concrete strategy for redeveloping the game in a way that was responsive to stakeholder priorities, as described in more detail in the second paper, *Viable metaphors*. The first and second workshops, held at the end of 2009, resulted in a number of changes to the ReefGame design and reflections about how fishers constructed their responses to alternative livelihoods and their participation in marine conservation, which are also captured in the *Viable metaphors* paper. However, from the third workshop on, it was difficult to discern how we were "improving". The vignette below captures some of the challenges, and is an edited amalgamation of ethnographic vignettes I wrote post-fieldwork (available on onefishtofish.com).

[8] For more information on the Mexico experiment mentioned in Figure 6 see also Cleland (2010) and Perez et al. (2009). *Viable Metaphor* also addresses the learnings from this previous work.

Vignette: Arrested loop development

We're a couple of rounds into the fishing game in the third workshop. Some have lost, others have hit the jackpot: the language of luck and lotteries peppers the fishers' descriptions of their daily hauls. Even so, significant falls in catches have begun to appear.

An illegal fisher is caught. It's not one of the real players, but rather one of the ghost ones, automated algorithms in the computer model. The Filipino facilitator tries to find out about local fisheries law enforcement by taking on the role of 'Mayor'. She declares "it's an election year, so I may be open to leniency in case it helps me in the polling booths." The fishers chuckle: this is a script they know. They join in: "yes, the mayor's very understanding and open to having a little chat, especially for first offenders, especially for people from big families with lots of voters". The local government representative goes along at first, confirming that first offenders (who vote) may well be able to talk themselves out of a fine. The banter continues, but some fishers express concern: they don't like the secrecy, the implication of unfair treatment. The government man begins to change his tune: he interjects sharply. He says "maybe the fishers will take this seriously: the mayor's not like that. You can't just talk your way out of the laws". The facilitator smoothly agrees, soothes ruffled feathers. "Yes, yes," she says, "it's not really like that. Don't take it so seriously. It's just a game. Just a game."

We break for lunch and the discussion is lost.

This scene comes to mind, a few months later, as I watch three illegal fishers leave the jail of a nearby island. A quick phone call, mayor to mayor, secured their release without charges. The police chief throws out the fisheries offence descriptions painstakingly typed out the night before. It feels like a mockery of the volunteer coast guard who are trying to patrol to protect their reefs from damaging fishing gear. These three are small fry: bigger boats could never be apprehended by the dilapidated dinghies used by the volunteers –they're too fast and often armed. But this mayor-to-mayor 'coffee favour', a local term used for these small acts of corruption, only strengthens the small-scale fishers' sense of abandonment and perpetual injustice.

I think, sadly, of the conversations we have not had.

The conversations we do not have pile up as the workshops continue. It's hard to pinpoint exactly why. We don't talk seriously about corruption, although it's alluded to constantly. We don't talk about a provincial government pushing for a commercial-sized wharf that may well spell the death of local reefs, as wharves have in other areas. We don't

talk about the violent death of a local politician who was campaigning to regulate a fishery rumoured to be under the control of drug traffickers. Instead, we put a lot of energy into making sure the events run smoothly, the presentations are well-rehearsed, the game-roles adequately explained, and all equipment present and correct. In this way, perhaps, we render 'manageable and technical' the interwoven problems of poverty, marine conservation, and power and control over resources we are trying to address: our project cannot pretend to solve these problems, but we can put on a good show.

In a significant moment of losing control of this narrative, in a post-game debriefing session, it was revealed that one local government unit was planning on allowing commercial boats into a recently declared marine protected area it shares with the neighbouring municipality. This was something that clearly had not been agreed on. Strong words were exchanged and key representatives threatened to walk out. A facilitator described themselves as almost having a heart attack when they realised that a conservation project was put into 'real life' jeopardy by discussions resulting from a 'play' marine protected area put in place during a game. Luckily, peace was reasonably rapidly restored with promises of further discussions in another time and place.

Several project members, including me, had just attended the fancy launch of the 'real life' protected area, complete with national dignitaries, cultural displays and traditional fare. The mayor who had decided to release the illegal fishers we heard about earlier made an impassioned speech about how all encroachers on the marine park will be jailed. A national telco donated a number of mobile phones to the volunteer coast guard to loud applause. I discover later that the phones were never given to them, and in any case the coast guard program had no money for phone credit.

Nevertheless, the marine park project was considered to be a landmark case of inter-government cooperation, and uncovering potentially fatal misunderstandings in the negotiations while the spotlight was on the project would have been clumsy to say the least. A veiled warning about 'opening cans of worms' was sent to all project staff: when you're 'fly-in, fly-out', it is best not to touch knotty issues that you will not have time to unravel. And, let it be remembered, I flew from the furthest away and am therefore the least likely to face any external consequences of indecent exposure…

The workshops wrapped up in mid-2010, with 240 participants, resulting in 300 hours of video data, and 25 000 data points collected from decisions made in the game. I was feeling lost in a sea of data, and completely ambivalent as to the worth and effect of our activities. The next six months was spent ensuring we met project deliverables, including creating and distributing the project toolkit and conducting a final train-the-trainer workshop, contributing to the sense of wheel-spinning and stagnation, represented in the overlapping loops of Figure 6. These administrative details show how objectives of generating 'expert knowledge' versus organisational priorities clash in transdisciplinary projects. These clashes cause tensions and institutional precarity for transdisciplinary scholars, with no real progress on solutions, especially for early-career scholars (Felt *et al.*, 2013; Russell *et al.*, 2008).

During this time of the overlapping loops (Figure 6), and into mid-2011, alongside FindFishSup I also participated in various workshops in five other projects, all of which were attempting to reach similar goals in terms of research, outreach and education for sustainable small-scale fisheries, both nationally and across the Coral Triangle region[9]. These projects did not form part of the data for this thesis, but rather demonstrated the wider context of how researchers and consultants were attempting to engage in 'fishy problems'. My observations pointed to a significant gap between what was meant to be happening –participatory, ecosystem-based management, to increase the wellbeing of both marine systems and the communities that depend on them –and what seemed to be happening – colonial/external imposition of means, coupled with local strategies to harness resources to produce scientific and organisational ends (in the form of producing papers and maintaining networks/alliances, respectively). Further, this seemed to be occurring in an entrenched cycle of activities such as workshops, meetings and conferences, almost indistinguishable in their form and achievements. A particularly telling example was a regional 'state of the coasts' meeting, where a fisheries bureaucrat from a neighbouring small island state told me how the south side of the main island had been surveyed in detail twice – once by the Americans and once by Australians – while the northern side had not been surveyed at all. And so I returned to Australia, now armed not only with the 'sea of data' but also a critical awareness of how coastal communities and

9 This includes: a World Fish Centre project that incorporated ReefGame into its alternative livelihood activities; State of the Coral Triangle; NGO-led marine park planning, implementation and enforcement; climate change adaptation and monitoring; and regional knowledge management for marine conservation.

the overall, holistic goals were sidelined in the privileging of organisational and expert knowledge, as Brown would have predicted (Brown, 2010b).

It is a matter of personal history that the following six years (mid 2011 – mid 2016) involved extensive time off my doctoral work for a myriad of reasons, some of which are documented in more detail in the final paper *Fishing for a career*. It is this time that I have represented schematically as the 'cloud of doubts and delays' in Figure 7. However, at various points during this time I (re)presented my research: in response to questions, in blog posts and in presentations[10].

Through this iterative re-telling of my research journey, I came to understand that this meta-story, of a research for development landscape littered with project failures, should only ever form the backdrop, and not the main content of my thesis. It is, as McKinnon points out, a favourite occupation of development researchers to retell the story of failure (McKinnon, 2016). Instead, she writes, we should cultivate a more "generous and appreciative" scholarship, made possible through "more tentative and open" explorations of possibilities.

The decision to create five individual papers, each corresponding primarily to one of Brown's knowledge cultures, then, was partially a pragmatic one to be able to complete this doctoral project successfully (as per the blow torch, pictured in Figure 7), and partially an attempt to 'openly explore' the possibilities, dissonance, tensions and contradictions I observed in my field work with 'generosity', while maintaining my critical voice. The papers were distilled from the 'sea of data' very slowly, helped greatly by conversations with my supervisors and others, although any weaknesses remain my own. This distillation required a process of transformation: of reimagining my data as, yes, still an ocean, but one that brimmed with waves that contained within them possibilities of as-yet undiscovered, lively stories (Fisher *et al.*, 2015). How I came to reinterpret my research journey to create the papers through a "transdisciplinary autoethnographic lens", using the knowledge cultures, is the subject of the next section.

10 The only time I felt I relayed its complexities and entangled state authentically was in an oral presentation in 2015, where I told the story somatically, with acrobatics and aerial dance, as well as with spoken word poetry and video, but this "fleshy and messy" (McKinnon, 2016) presentation is perhaps impossible to capture in text.

Transdisciplinary autoethnography through the knowledge cultures

"And so he is endowed with the remarkable power to establish the facts. He bears witness: he is objective…His narratives have a magical power – they lose all trace of their history as stories, as products of partisan projects"

(Haraway, 1997)

This section first explains autoethnography, as presented in the literature. I then describe how I integrated the knowledge cultures framework into an autoethnographic lens, a methodological extension and unique application of Brown's knowledge cultures.

Autoethnography can be considered "evocative interpretivism" (Doloriert and Sambrook, 2011), where a compelling account of personal experience is given with the expectation of creating broader understandings or insights (Ellis *et al.*, 2011). Instead of ignoring my doubts, quandaries and struggles that were the feature of my doctoral project as an embodied and emotional journey, autoethnographic accounts assume that such reactions and experiences reveal important aspects of social life that may otherwise stay unexamined. Further, like Doloriert and Sambrook (2011), I struggled with whether or how to characterise my research journey within an action research lens. Doing so would have been centring (my)self in the change process of communities that are most decidedly not my own, a position I felt deeply uncomfortable with. In contrast, autoethnography acknowledges the central role of the researcher in the unfolding context of a research project, without assuming that they can claim to take responsibility for or control the direction of any social change that occurs. Standard data-collection methods primarily rely on journaling and other personal reflection documentation (Saldaña, 2015). I particularly drew on the technique of 'ethnographic vignettes', where I wrote up interpretive responses to 'nodal' or 'pivotal' moments of intense emotion, tension and conflict (Henry, 2012; Trigger *et al.*, 2012). An example vignette is above, others are published on my blog onefishtofish.com.

Brown (2008) predicts the inevitable criticism of autoethnography in her typology of how the other knowledge cultures dismiss individual knowledge as being subjective, limited and vague (as in Table 1). As pointed out by Bullough and Pinnedgar (2001), there is a tension between a confessional, on one hand, and erasing the self as in traditional research. How, then, to avoid self-centred solipsism, when presenting memory-as-research? Russell (1999) claims that ethnography emerges from autobiography when the

individual "understands his or her personal history to be implicated in larger social formations and historical processes". Harrison (2013) echoes this in her call for development-focussed autoethnography to engage with institutional relationships and power, but still expresses misgivings about the tendency towards narcissism.

Indeed, the problem with a focus on institutional relationships and power is that in the case of FindFishSup, as discussed, this did not offer many opportunities for constructive, rather than deconstructive, contributions. Indeed, my attempts to write that story (as depicted in the time of doubts and delays) had resulted in several mental health crises: I became lost in the 'rubble' of the 'critique game' (Braithwaite, 2004a). Instead, I needed an autoethnographic lens that could see and understand the structural limitations of the project, and top-down interventions in small-scale fisheries more generally, but also amplify the "glimmers of possibility that exist in the here and now" (McKinnon *et al.*, 2008). Diverse theorists argue that this orientation towards critical hope is part of, and essential for, transformative change (Braithwaite, 2004b; Braithwaite, 2004c; Gibson and Cameron, 2005; Haraway, 1997; McKinnon *et al.*, 2008; Young, 2002).

The first step to transform my own view of the possibilities held by my ocean of data was to reconceptualise the entirety of my field experience as a process of collecting data to integrate and contribute to each of Brown's knowledge cultures. To do this I inverted Brown's knowledge mandala to put the individual inquirer at the centre, rather than at the outer rim representing the perspectives of multiple people. This creates an integrated autoethnographic lens, and means the holistic view – the ideas of sustainability, justice and inclusion – form an aspirational framing, rather than an idealistic core (Figure 8).

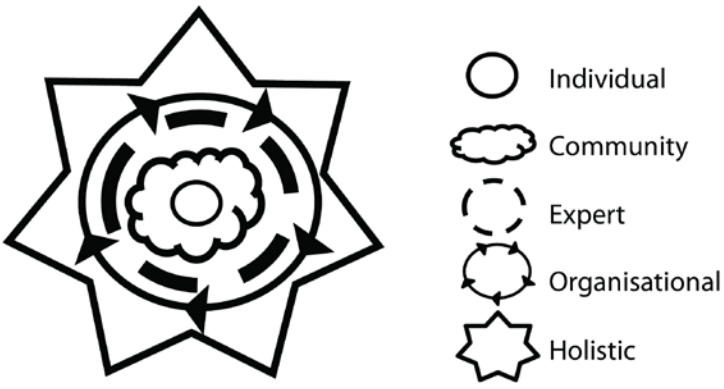

Figure 8: An inversion of Brown's knowledge culture mandala to form an autoethnographic lens

Using this integrated autoethnographic lens, I analysed the 'ocean of data' – my collected memories, field notes, videos and video transcripts, ReefGame results and

project documentation –by passing it through each of the knowledge cultures as a single lens (see diagram below). Here, I employ a 'diffraction metaphor' (Barad, 2014; Haraway, 1997) to conceptualise how to reveal otherwise invisible patterns, that is, how to discover something other than rubble in my ocean of data; how to locate in the waves the possibilities of lively (or at least useful) contributions to knowledge. Diffraction is a physical phenomenon whereby wave patterns (are transformed after encountering an obstacle, in this case a knowledge lens (Barad, 2007). As my data encounter the 'obstacle' of each of the perspectives of the knowledge culture (Figure 9), they are materially changed. The interaction transforms how those data exist in the world, what they can do, who can understand them and how I can understand my experiences both in the FindFishSup project and the enterprise of scholarly becoming that is researching for a PhD.

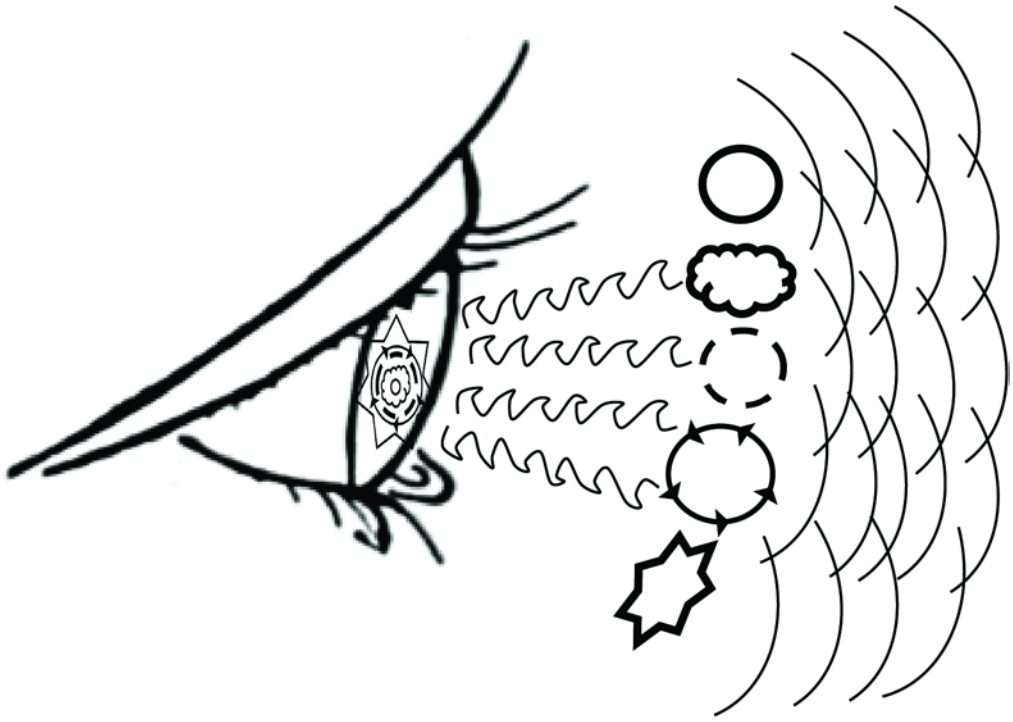

Figure 9 Knowledge cultures as obstacles to create five diffraction patterns
Here, I use the integrated lens to 'force' my ocean of data through the knowledge cultures, to create five diffraction patterns.

The overlapping 'diffraction patterns' revealed by the data passing through the knowledge culture lenses (Figure 9) is what is contained in each paper. This allowed me to create and amplify what each knowledge culture finds valuable. Individual knowledge feeds on experience – is hope necessary for engagement (*Hope)*? Communities need to engage in shared experiences to create collective stories. Can play help with this (*Viable*

metaphors)? Researchers use measurements and observations to extract understanding, so what had we measured and seen *(Playful shift)*? Stakeholder workshops are a sustainable development institutional staple, so what are some strategies to work with what we have (*Rehearsing inclusion)*? Finally, and perhaps most improbably, what imaginative flight of fancy will enable a holistic vision hitherto unavailable (*Fishing for a career)*?

Overall, however, it is the multiplicity in the diffractive process that is most valuable here. In telling many stories, in refusing to tell just one story, this thesis attempts to displace the monolithic binary thinking of yes/no, success/failure, self/other, thesis/antithesis with diffractive, dialogic thinking (Haraway and Wolfe, 2016; Pathak, 2010) which allows for an intimate, ethical engagement with the entanglement of fish, fishers, studiers of fisheries, and examiners of studiers of fisheries. This: a small step, a hope, following those before me, that in encouraging inclusive thinking and writing, we can indeed create a more inclusive world.

The Papers Herein

"Tasty dishes from stale bread"

(Harwood, 1968)

Here I reintroduce the papers, now situated within the knowledge cultures. Whilst each paper focuses on one culture, I have tried integrate elements of each, as per Brown's edict (2010b). Specifically, because of the need to pass through peer review to be published, all contain elements of expert/disciplinary knowledge. Also, the overarching, holistic ideas of sustainability, justice and democracy, the organisational goals of the project, and the underpinning common denominator of my personal experience flow through each.

Through the individual lens, I connect my lived experience as the source of my individual knowledge (Brown, 2004) to a rich literature of hope, formed through theological, philosophical and regulatory studies (Braithwaite, 2004c) in *If wishes were fishes: hope sustaining action in marine management*. I claim play helps re-imagine the world, even where its potential is stymied by undercurrents of neo-imperialism (an occupational hazard as a white researcher in a post-colonial nation). Then, in turn, I can, play the "believing game" (Braithwaite, 2004a) and structurally explore what contributions the FindFishSup project made to the world of research and practice, without losing the 'critique game', which is able to simultaneously acknowledge downsides and trade-offs.

This approach is carried through the next paper, *Viable metaphors: the art of participatory modelling for communicating sustainability science,* which examines how to design game-based models, like ReefGame, to enrich dialogue and learning in interpersonal encounters. I present a principles-based design method, arguing that participatory models must be playable, recognisable and suitable for participants. These principles enable a redesign of ReefGame from a 'single-stakeholder' to 'multi-stakeholder' game that can be used for learning and engagement with fisheries stakeholders across Filipino municipalities with very different socio-economic characteristics, and provide a practical framework for others wishing to use similar methods.

Thirdly, to understand game play from an empirical lens in *A playful shift: field-based experimental games offer insight into capacity reduction in small-scale fisheries* I analyse the decisions made by the fishers to reveal the patterns across and within the workshops. Taking the analytic methods of similar experiments in economics, I look for social explanations for game-based behaviour, revealing important, yet underexplored aspects of how fishers make decisions to leave or stay in the fishery, including parental aspirations and local economies. That fishers' decisions were made irrespective of their catch income in the game is the starting point for an analysis that centres on non-economic drivers of livelihood decision-making.

Fourthly, I cast a strategic eye on the workshops to ask how they worked (or not) to aid interactions between stakeholders in *Rehearsing inclusive participation through fishery stakeholder workshops in the Philippines*. Here, I focus on the broader phenomena of 'stakeholder workshops' as a staple activity of 'conservation for development' projects: this is an organisational reality. I characterise workshops as 'contact zones' –"social spaces where cultures meet, clash, and grapple with each other, often in contexts of highly asymmetrical relations of power" (Pratt, 1991). To understand interactions in the 'contact zone', I integrated Iris Marion Young's (2002) theory of inclusive democratic communication with insights from Philippine psychology. This integrated framework structures a pros and cons analysis of how stakeholders interacted during the game, and, in turn, how these insights can improve our understanding, and more importantly our practice, of inclusion and participation through workshops, through using methods that spark improvisation and enable resistance to dominant narratives.

In contrast, the final paper *Fishing for a career: alternative livelihoods and the hardheaded art of academic failure* examines the systemic failures of late capitalist societies to provide secure, liveable livelihoods for their citizens. It compares self to fisher – a

creative leap, an unexpected connection (Brown, 2010c) – with a 'diffractive inquiry', where two ethnographic accounts are 'read through' each other for 'resonance and dissonance' (Barad, 2007; Van der Tuin, 2011) to recreate a new vision. One account is my experiences as a casual labourer and student in a Western university, the other my observations of the fishers' attachment to livelihood through my fieldwork in the Philippines. The overall question is; how can we find hope when literally and metaphorically *Fishing for a career*? It is quite difficult to argue for a positive reading of either fisher or academic livelihood possibilities for the fishers and the studiers of fisheries, but here and through the conclusion I offer a few ideas for next steps. This final paper finishes on an emotional note in keeping with my employment prospects as a woman who took more than eight years to complete her doctorate, part bravado, part outrage, part despair, but still with the necessary kernel of hope: hope is, after all, the core of the matter (Braithwaite, 2004b; Braithwaite, 2004c; Brown, 2010c). Creatives, unlike scholars, do not have to justify their centring of emotion over logic and evidence, and so this piece is rich in rhetoric, metaphor and feeling. Its reception in the scholarly world remains uncertain at the date of submission, but within this thesis it serves its methodological role of completing the novel exploration of the knowledge cultures as an integrated autoethnographic lens.

Summary & next steps

In introducing the overall methodological framework, I offered the rationale for following a transdisciplinary methodology when operating as a participant-observer in a project aiming to tackle sustainability through participatory methods. The research steps taken were described through following a critical learning spiral framework through to stagnation and collapse, followed by a period of nebulous and unproductive critique and a personal crisis. The process of distilling the content of the papers that follow was framed through a modification of Brown's five knowledge cultures to create a diffractive autoethnographic lens. The introduction to each paper expands on its 'cut' or role in the overarching narrative, its position in the knowledge culture framework, and the academic context (the expert knowledge culture). This includes reflection on the review process and reviewer comments as an often hidden part of the critical learning of scholarship, which is particularly revealing of the 'riskiness' (Fisher *et al.*, 2015; McKinnon, 2016; Rendle-Short, 2010) of going outside straight academic norms for knowledge production and presentation. Finally, I conclude by drawing together the contributions of the thesis, the limitations of the same, and a framework for ethically engaging with 'fishy problems'.

1. Hope

Knowledge culture	Sources of evidence	Sources of dismissal
Individual 	Memory Emotion Values Reflection ("I enjoyed this piece very much")	Subjective Limited Vague ("Unclear")

Adapted from Brown (2004; 2010a; 2010b); comments from peer review in brackets.

Overview

The first paper is a non-fiction essay published in the 'Wicked Problems[11]' edition of the Griffith Review, an Australian writing journal, following peer review. As an autoethnographic text, it is written principally from the individual 'reflective' knowledge culture, which is blended, only partially successfully, with holism and expert elements. The partial success is captured by the criticism by one of the reviewers that it seems to "fall uncomfortably between a personal essay about the writer's experiences as a researcher, and a more scholarly piece about the value of fantasy and comedy as catalysts for creating a sense of hope." Written just after I finished my fieldwork, it was born of early personal reflections on whether I could justify 'playing' with serious issues. As Donna Haraway has remarked "when you start talking about things like joy and play, you're marked as if you're automatically not talking about politics in some serious way" (Haraway and Wolfe, 2016).

To embed my playful work in a 'serious' disciplinary tradition, I looked to the literature, particularly drawing on Valerie Braithwaite's work on the ancient virtue of hope (Braithwaite, 2004b; Braithwaite, 2004c). Following the work done by her and other scholars, I make a case for hope as a necessary and rigorous intellectual concept that can guide both theory and action in tackling 'wicked problems'. Indeed, without hope, paralysis is inevitable. This means that personal agentic efficacy – the will, the motivation to act in dire situations – stems from hope. This is the affective, emotional orientation of all work following. The values-based claim is that if you bring people together to play, if you play a hopeful game, then you keep playing – and the alternative is giving up, and giving in.

11 Wicked problem has come to mean any problem that causes seemingly intractable conflict or seems 'unsolvable' (Brown 2010, citing an original concept by Rittel and Webber 1973)

Paper - If Wishes Were Fishes: Hope Sustaining Action in Marine Management

Published in the *Griffith Review*, vol 32 (2011), pages 414-424

I listlessly trawled through endless canned quote pages, searching for a line that would capture my feelings and ideas about the links between fun, participation and problem-solving. Where I found it now eludes me, but it was this line from Harvey Cox's *The Feast of Fools: A Theological Essay on Festivity and Fantasy* that became my refrain: 'the comic, more than the tragic, because it ignites hope, leads to more, not less, participation in the struggle for a just world' (Cox, 1969: 153).

Why does this sentence hold such attraction? Is it the fiery imagery, the idea that hope, once released, would spread like an inferno, extinguishing poverty and inequality? The promise of leaving behind the endless cataloguing of disasters and documenting of irreversible declines in exchange for something lighter, more palatable? Or because it evokes that irresistible mythology of the '60s: a true people-power revolution?

Perhaps all of these, but above all it made me remember a simple common sense affirmation, *it's important they see hope in all of this*, that has helped me through times of feeling useless, desperate, pessimistic and irrelevant – emotions that are mirrored in the stories of workers, volunteers, researchers and activists working in environment and development the world over.

I remember the moment clearly, as it was surrounded by flamboyant symbolism of the series of interlocking, globalised processes that had brought me, a young Australian undergraduate, together with some of the Philippines' top marine scientists in mid-2007. We were in an American chain pizza restaurant on the top floor of one of the signature mega-malls that pepper Manila's skyline. Disregarding our knowledge of fish biomass trajectories, we ordered seafood pizza, and discussed the dilemma. Our research group needed to create some computer models for coral reef managers, preferably useful ones, but that was secondary. Such is the vagary of international aid and research funding – the cure is diagnosed before the illness, and we are left trying desperately to find problems that can be fixed with the medicine that we have.

Our research site was Bolinao, a coastal town in the northern Philippines. Artisanal fishers, often armed with nothing more than a patchwork sail and improvised bamboo cages, number in the thousands in Bolinao's nearshore waters, perched between the western rim of the Lingayen Gulf and the South China Sea. Happily for Bolinao, we could

characterise its situation in great detail. Generations of students and academics from the University of the Philippine's Marine Science Institute and its international partners, based at the coastal campus just outside the township, have collected biological, chemical, ecological and, albeit in much lesser volume, socioeconomic data from the land and the sea (See, for example, Ahmed *et al.*, 2007; McManus *et al.*, 1992; Oracion *et al.*, 2005; Pet-Soede, 2000; Silvestre and Hilomen, 2004; Talaue-McManus *et al.*, 1998). They tell a sorry story now familiar to us all: the dismal failure of modern populations to effectively manage the natural resources upon which they depend.

Daily fish catches in Bolinao now number in single digits. These catches are not enough to feed an 'average' Filipino family, still less the often more numerous households occupying the ramshackle slum villages along the thin beaches. Household surveys tell us that the fishers are often functionally illiterate, and many do not complete even minimal schooling (Cruz-Trinidad *et al.*, 2009).. Stock assessments document precipitous falls in fish populations. Habitat mapping shows mangrove deforestation, corals destroyed by blast fishing (now uncommon, thanks to an integrated effort by local officials, community leaders, aid agencies and MSI staff, but the scars remain) and seagrass meadows cleared for aquaculture (Primavera, 2006).

Some locals have recognised that the seas, like the forests and grasslands before them, can be converted into mechanised production systems once nature's bounty has been razed beyond repair. However, not everyone can access the capital necessary to set up expensive aquaculture pens, nor buy the processed food (often made from the protein of wild caught fish, whose volume exceeds that of the aquaculture's production, but that's another story (Deutsch *et al.*, 2007)). Instead of providing alternative livelihoods, the burgeoning aquaculture production has often further excluded local fishers, who now have to navigate through the murky maze of pens out to the open ocean for their meagre catches.

Back, then, to our seafood pizza, and proximate dilemma. What could be done, and could a computer model do it? Having just been acquainted with the dismal situation sketched above, I can probably be forgiven for exclaiming, 'What's the use? This is *hopeless*.' Dr Porfirio 'Perry' Aliño, a faculty member of the Marine Science Institute, turned to me with an uncharacteristically serious look: 'But Deb. It's important that the fishers see hope in all of this,' he said.

I can't say I saw the significance of Dr Perry's comment straightaway. But his words returned to me over the coming months, as our computer model took shape.

We had never intended to create a model in the global-climate-change super-computer sense: time was too short, and our epistemological inclinations ran in a different direction. For starters, our understanding of the motivations and barriers affecting fishers' decisions was limited, at best. More importantly, however, modelling the human behaviour at the heart of the fisheries problem reinforced the inevitability of the positive feedback loops that were perpetuating poverty cycles and environmental decline. With limited education, high immigrant populations, low social status and limited financial buffers to allow a risky move out of the fishery, subsistence fishers are often described as 'trapped' into further degrading their livelihood base.

Our model needed to play with this reality. Poke holes in the intractable, loosen up the strings that bind the fishers, just like the rest of us, to their everyday habits. Be fun. Be funny. Be the comedy that ignites hope.

A tall order for a computer model, yes. But maybe manageable for a computer game. Here perhaps we could get closer to Harvey Cox's call for a return of the role of fantasy in forging better futures. Through this, I saw a new role for my supervisor's attachment to role-play games combined with computer models as a way of encouraging learning and relationship building among diverse stakeholders. From Kiribati to the western wheat belt, to the drug dens of inner Melbourne (Assenga *et al.*, 210; Dray *et al.*, 2006; Perez and Dray, 2005), the technique has been used to forge connections across disciplinary and societal divides.

So we made the fishers themselves the focus of our exercise, creating a game that aimed to enable them to engage creatively with two core problems – alternative livelihoods and marine-conservation strategies – while encouraging playful interactions with their peers (Cleland and Wyborn, 2011; Wyborn and Cleland, 2010). Fun became an explicit aim. As noted in Westley, Zimmerman and Quinn Patton's inspirational book about making change happen, *Getting to Maybe* (Vintage, 2007), 'social innovation requires that while we may not be able to predict outcomes, certain kinds of interactions are more likely to result in transformation than others' (Westley *et al.*, 2007: 27). While boredom is not specifically addressed, it seems self-evident that bored people are unlikely to come up with new and interesting visions for their future, nor will they form the kind of interpersonal

relationships we think are important for successful resource management at the local level. Without vision and peer support, hope would truly be lost.

In the book *Tackling Wicked Problems through the Transdisciplinary Imagination* (Earthscan, 2010), Emeritus Professor Val Brown of the Australian National University's Fenner School for Environment and Society points to the importance of 'creative leaps' of the imagination in finding solutions for our 'damaged planet' (Brown, 2010c: 295). Nearby, the co-founder of the Regulatory Institutions Network research group, Professor Valerie Braithwaite, spearheaded a project that linked hope and imagination to renewal, improvement and progress in areas as diverse as rehabilitation programs, tax systems and post-apartheid reconciliation, showing hope's surprisingly broad utility (See the special issue of The Annals of the American Academy of Political and Social Science, especially Braithwaite, 2004c).

Hope enables us (the researcher, the activist, the philanthropist) to enter a 'problem space' open and ready to find solutions, rather than despairing and inclined to see the fishers and their analogues around the globe only in terms of what they lack, rather than what they have and can make use of (Cameron and Gibson, 2005).[12]

This is the beginning of a framework that reaches far beyond the idiosyncrasies of our Filipino fisheries model dilemma. In a blog post from 2007 Julian Assange pondered the quandary of our bird's eye knowledge of the planet and its problems: 'To exercise your instinct for saving the world requires saving what you perceive to be the world. Being modern, educated and worldly, the world you perceive is immense and this is disempowering…Your perception is of a world so vast that that you cannot envisage your actions making a meaningful difference' (Assange, 2007).

Assange suggests that we often deliberately limit our horizons – choosing self-delusion in order to be able to conceive of our own impact, and then act accordingly. Braithwaite and colleagues, however, offer a more encouraging path, through 'collective hope' – made possible through our trust and belief that others have marked out their own patch, share our vision, and are somehow extending the reach of our impact. Such collective hope reconciles our need for global change with local action.

Many have recognised the importance of paying attention to the possible. After John Braithwaite's gloomy assessment in 2004 of the preponderance of pessimism and

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[12] See also J.K Gibson-Graham's work on community economies (www.communityeconomies.org)

negativity in research (Braithwaite, 2004a), it seems the tide turned. Positive psychology is probably the best-known manifestation of a groundswell movement of people convinced of the benefits of rose-coloured glasses. It is possible that positive and pop psychology only share an unfortunate alliteration, but I'm instinctively (and perhaps unfairly) turned off by the chirpiness on display as I wander through the self-help sites produced by this vein of study. Hope seems more solid, fun more genuine and comedy more timeless than a glib justification of the pursuit of happiness.

But does it really work? And what of our fishers? ReefGame, as our game became known, has now been played by around 250 people around the Philippines, thanks to a subsequent grant from the David and Lucille Packard Foundation's Ecosystem Based Management Tools Demonstration program to the Marine Science Institute's in-house foundation (see PhilCRM.org). In multi-stakeholder workshops conducted in the sub-zero environment of hotel convention centres you can feel the temperature of the room rise several degrees as people jostle for space around the game board, laughing and joking about their relative misfortunes and attempts to borrow money from neighbours. Participants would often ask to play extra rounds, even if it were snack time – almost unheard of in a culture that venerates its mealtimes, and in communities who have been left more than a little workshop-weary after several decades of participating in projects run by a plethora of international donor agencies.

We seem to have ticked the box for comedy and fun leading to participation. What of hope? As catches declined and incomes dropped in the initial stages of ReefGame, facilitators were often met with disbelief: 'Why is the coral dying? What is happening to our catches – are there illegal fishers?' Fishers have a tendency to blame other people for the problems of the sea: 'the illegal fishers', 'the encroachers', 'the government'. But as the game progressed, fishers usually took control of their situation, inventing livelihoods and small-business activities to supplement and replace fishing income, and convincing local government representatives to pay them to become part-time coast guards.

Hope springs from a realisation of our power to act (McGeer, 2004). Once we realise the world is malleable, we can begin to articulate a vision to change it. Herein lies the value of our game – if it could function as a viable metaphor for the world outside, the lessons learned would be transferrable.

However, the 'hopeful' reaction was not universal. Some participants did not play with the open boundaries I thought we were offering. A few, faced with catch declines,

chose to opt out altogether, 'staying home to eat cassava' rather than dreaming up alternative occupations or participating in the conservation and rehabilitation of the fisheries.

Worse was my own realisation of how limited our vision was. Yes, the fishers could creatively use their diverse skills sets to come up with ideas about possible livelihoods, and yes, the virtual world removed (at least temporarily) some of barriers to change that exist in the real one. But I had been too dull, too co-opted, to recognise how we presented mixed-market western capitalist solutions as the clear, logical pathway out. The vision of trickle-down development and a worker economy was never far from the surface. We had made very little space for co-operatives, for volunteers or for cashless transactions. With such blinkers, surely we were presenting the fishers with a nail and asking them to come up with an appropriately shaped tool?

And what relationship does it have to reality, anyway? Were we just encouraging a latent 'monopoly' personality in our participants that had only coincidental congruence with real-world decision patterns? It was hard not to wonder whether hope, fun and comedy really have anything to offer in the face of such large-scale destruction, desperation and despair.

Am I right to continue from where I find myself, building models and playing games, or should my need to perceive 'meaningful difference' be relocated? My natural antonym is the community-led restoration program run in Bolinao by the visionary founder of the Marine Science Institute, Dr Edgardo Gomez. Marine biologists train locals in the delicate art of coral husbandry and transplantation. Using improvised goggles they carefully wedge the juveniles onto the reef substrate, praying they survive the next typhoon, boat grounding or crown-of-thorns starfish invasion (Coral Reef Targeted Research and Capacity Building for Management Program, 2000). Sister projects led by Dr Annette Meñez have communities rearing high-value species, for now just to restock natural habitats and supply local buyers but with the idea of tapping into global ornamental markets. Isn't this the altogether more practical and efficacious way to go? When the problems are so urgent, can we justify playtime – experimenting with people's hopes and dreams, with the growing feeling that all we will achieve in the end is make them laugh?

I asked myself if it is disingenuous, then, to incorporate hope into fisheries, an area where economic and environmental catastrophes are the canaries in the coalmine of our ailing planet. With the right mix of realism and optimism, action and attitude, David Ritter

has offered the perfect answer: 'beneath the surface and sinking, with hope and will we can still strike back upwards toward the light' (Ritter, 2009: 130). For the researchers, development practitioners, government officials, conservationists and, above all, the fishers themselves, hope is the critical ingredient that enables the imagining of an improved future, puts wind in the sails of flagging spirits and tides us over until action is possible (Braithwaite, 2004c).

Those of us aspiring for change have our favourite weapons that we brandish at the world. Armed with keyboards, facts, thermometers, nubbins and placards, we choose our paths and our horizons.

I think I will cling for a little longer to my armament of choice, despite its mixed results. Complexity theory tells me that I cannot predict or control the outcomes of my attempts to engage with the world. But I can believe in (hope for?) its power to tip the scales in favour of change: to gather together those who have the power to flip the system, and give them a chance to piece together a new image (Westley *et al.*, 2007). If we insist that people always work within the tactile world, we lose that incendiary power of fantasy to take us to solutions 'outside the given' (Cox, 1969). And even if all we are able to produce is glimpses of a radically different future, this may be enough to generate momentum in the present.

2. Viable metaphors

Knowledge culture	Sources of evidence	Sources of dismissal
Community 	Stories Shared experience Dialogue ("We are breaking new ground here, exploring how models and games can help to integrate, disseminate and implement knowledge.")	Gossip Anecdote ("no scientific method")

Adapted from Brown (2004; 2010a; 2010b); comments from peer review in brackets.

Overview

Having established a hope-based framework, and thereby creating a retrospective mandate to play games with fishing communities, this paper (*Viable metaphors*) goes on to ask the question 'how do you design an effective game-based participatory model to facilitate engagement and learning?'. Here, it is taken as given that learning occurs through social processes of interaction and dialogue, as per Brown's concept of the community knowledge culture. To answer the question, I introduce the concept of the viable metaphor, arguing that participatory models must be recognisable, suitable and playable to act as an effective springboard for dialogue. These principles were derived inductively from my previous experiences presenting games to multi-stakeholder workshops. They reflect the need for these tools to be tailored to specific place-based characteristics to facilitate discussion about the resource problem at hand.

This paper takes an explicitly iterative and reflective approach, in keeping with the methodology and philosophical orientation described earlier, as I first describe and then apply the principles to the design of ReefGame. The final part of the paper then critically reflects on how successfully the principles helped to create dialogue-rich environments for building knowledge and shared understandings for conservation in small-scale fisheries. I identify a number of trade-offs, but conclude that overall the approach successfully guided a community-based dialogue process within the FindFishSup workshops.

The paper was rejected without going to reviewers from two self-identifying 'multidisciplinary' natural resource management journals, before finding a home at the Knowledge Management for Development Journal, the outlet for a community of practice of the same name (www.km4dev.org). The editors from the rejecting journals criticised the paper for lacking "disciplinary approach" and eschewing the "scientific method", opting for a more "descriptive" methodology. Interestingly however, these criticisms

pointed to the potential strength of the paper, crystallised by a reviewer's suggestion that I review the '"behavioural theory" incorporated in another paper. The recommended paper used a 'common resource' game with a plate of M&Ms (small multi-coloured chocolates) played by undergraduates to explore overexploitation in unregulated common resources (Hazlett, 1997).

In previous work (2012) I explicitly discuss the learning and engagement limitations of such "context-ignorant" (Jackson, 2012b) lolly games, based on my own decade of experience teaching small-group geography classes with similar tools (and ReefGame). As I wrote "such games often fail to elicit discussion of important ecological concepts such as thresholds, feedback, ignorance, uncertainty, stochastic events, and synergistic or nonlinear interactions between social, cultural, and economic factors" (Cleland *et al.*, 2012). Indeed, the 'point' of the M&M exercise was to make an esoteric mathematical model to argue a-contextual theoretical ideas about common resource management in an academic journal (Hazlett, 1997), and not engage multi-stakeholders in discussions about place-based, historically specific and currently relevant conflicts over trade-offs between conservation and livelihoods as in ReefGame (Cleland, 2017a). This point of redirecting research toward genuine respectful engagement with partners, rather than simply collecting data for models of attitude and behavioural change is at the heart of the contribution of this thesis.

This example is significant for how it renders the consequences of the clash of knowledge cultures clear in terms of what is excluded from mattering (Barad, 2007). Community knowledge, which is situated, contextual knowledge developed in dialogue in a specific time and place, is rejected in favour of decontextualised, "universal" theories of the 'Everyman'. Indeed, the use of 'disciplinary' terms to reject the paper (e.g. not "scientific") reflects the standard language used to dismiss community knowledge based on shared experience (Brown, 2010b). The commitment of transdisciplinary researchers to create knowledge products, like ReefGame, that operate outside 'disciplinary approaches', and target non-academics, is recognised as being risky, particularly for early career researchers and PhD students (Felt *et al.*, 2013). The existence of friendly communities, such as the Knowledge for Development group, reassures that there *is* a place for those trying to integrate community and expert knowledge, but the impact in preaching to the converted is likely to be limited.

How to navigate this problem, within my skill set, is a pending question –it may be that the lone endeavour of a doctorate is simply ill-suited to conquering academia's rejection of

other forms of knowledge (Brown, 2010c), and that ensemble efforts will have more luck navigating these borderlands. Recent work by Fisher and colleagues (2015) and (Gibson-Graham *et al.*, 2013) indicate that there is a growing community of scholars and others who are working collaboratively and successfully in this space: for me finding such a tribe and joining it is part of future work.

This paper conflates to a certain extent the historical existence of a ReefGame 1.0 (described in Appendices 1 and 2) and ReefGame 2.0 (used in FindFishSup), discussed in the introduction. To be clear on the differences and what the specific contribution of my doctoral work was, I have included a table at Appendix 3 that describes the additions made to ReefGame 2.0 compared to its predecessor.

Paper - Viable metaphors: the art of participatory modelling for communicating sustainability science

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Abstract

Overexploitation is at the centre of an accelerating trajectory that is undermining the long-term ability of our planet to sustain human life. Therefore, the future of humans does not rely on generating new knowledge, but rather on integrating, disseminating and implementing knowledge we already have. Models are one tool for this: by synthesising and representing what we know, models can be useful in answering questions about what should be done. One approach is to create a game in conjunction with a model in a participatory setting. Integrating theory and critical reflection from field experience, I argue that, to be useful, this type of model/game must work as a 'viable metaphor'. This means making the model recognisable, playable and suitable for its intended audience and socio-ecological setting. This paper describes how to apply these three principles to create a gamified model, using the example of 'ReefGame', which has now been played with around 500 fisheries stakeholders in the Philippines. Focusing on small-scale fishers, ReefGame facilitates discussions and raises awareness about overfishing, alternative livelihoods, marine protected areas and coral reef ecology. Following a principles-based 'viable metaphor' design process enabled creating a game/model that contributed to both learning and engagement.

Introduction

The litany of problems affecting the planet hardly bears repeating. Suffice it to comment: the issue is very serious and the causes are largely known and understood (Jerneck *et al.*, 2011; Millennium Ecosystem Assessment, 2005). Whilst gathering ever more details about the drivers and the rates of change is potentially useful, the problems are already clear. Instead, as many authors have pointed out, integrating, disseminating and implementing current knowledge is now key (Bammer, 2005; Hering, 2016; Van Kerkhoff and Lebel, 2006).

Models, algorithm-based representations of our understanding of a given system, are more popular amongst the academic community than with managers (Curtice *et al.*, 2012).

Nevertheless, models are generally acknowledged as providing useful syntheses of scientific knowledge, leading to fresh insights into how to tackle increasingly urgent problems (Weijerman *et al.*, 2015). These insights, however, are of limited use if they are never understood, accepted and acted upon by those who have the power to do so. This is a compelling reason that participatory modelling is a growing field of interest (Dreyer and Renn, 2011). Models can help stakeholders develop common understandings of a problem, beyond just scientific facts to the nature of socio-ecological linkages of power and relationships. Models offer a structured framework from which to explore potential solutions, with the people who are most likely to affect outcomes or be affected by them (Lachica-Aliño *et al.*, 2006). Deliberately involving stakeholders thereby acknowledges the ethical questions at the heart of resource management decisions. That any given ecosystem "may recover given reduced exploitation" (Worm *et al.*, 2009) is a scientific statement, supported by the best available observable evidence. However, who should reduce their exploitation, and how, is a political and social decision that unevenly impacts different groups.

Notwithstanding the above, many scientific models and even text-based tools are too complex and technical to be easily interpreted by the people who we would hope to use them. In the case of conservation, this is the managers and end-users, be they fishers, farmers or foresters. Where they have been catered for, interventions tend to be project-based, involving intensive, one-off participatory processes, resulting in tools that are specifically designed for a particular time and place, rather than ones that can be used sector-wide (Dray *et al.*, 2006). This has resulted in the 'single-use' trap identified and critiqued by Curtice et al (2012), where tools without champions end up archived and forgotten.

This paper addresses this gap by introducing a design process for creating participatory models that can have broader application, without relying on time-consuming and resource intensive processes that result in such 'single-use' tools. It draws upon the work of other scholars, who have found that combining participatory modelling with games promotes social learning among resource users (Jones *et al.*, 2009). These 'computer-assisted' games are explicitly focused on creating dialogue rich environments for building knowledge and creating shared understandings for conservation. By incorporating the 'real' decisions and inputs of stakeholders into each time-step of a model, games can help models overcome the questions of legitimacy, relevance and utility that are often levelled at them (Ravetz, 2003).

Perhaps most importantly, games allow for a number of different groups of stakeholders to interact around particular issues that are affecting the management of their resources. Finding effective ways to bring people together in multi-sector forums is a key to successful integrated environmental management (Courtney and White, 2000; Hemmati, 2002). These kinds of participatory models therefore contribute to two important goals: 1) learning about the problems, and what to do about them, and 2) engagement of, and between, stakeholders.

This paper also responds to criticism that design principles for both gaming and participatory modelling tend to be informal, overly general and focused towards evaluation, rather than the design process itself (McGee, 2007; Norling *et al.*, 2013). I fill this gap by introducing design principles that are formalised, broadly applicable, helpful for creating participatory models, and, perhaps most importantly, strongly grounded in critical reflection after field experience. I then go on to describe how these principles were applied to create the game-model 'ReefGame', an interactive modelling tool for fisheries stakeholders. Finally, I discuss how the principles contributed to the game becoming an effective learning and engagement tool for multi-stakeholder workshops held in the Philippines.

Creating a viable metaphor: participatory modelling design methodology

Participatory models differ from standard scientific models, as they need to be interactive and interpretable. For this reason, I argue that a participatory model must operate as a viable metaphor for the resource problem it is designed to address. Let's elaborate on this new term. First, 'viable' introduces the idea that the metaphor/model must 'work': it must succeed in its ability to create an image of a real thing that resonates with the intended audience, in this case fisheries' stakeholders. Second, understanding a model as a metaphor is useful, as it emphasises 'representation' rather than 'replication'. A model is not a miniature world, rather it is a suggestion of what certain aspects of the world are like: a map is not the land (Ravetz, 2003). Similarly, the word metaphor reminds us that art and style –that is, design choices for aesthetics and interpretability –are inherent to all models. Both input and output interfaces, whether dials, toggles, fields, graphs or maps, contain cultural and symbolic meaning that allows them to be understood. An example is the colour red signifying exceeding limits; another is 'up' meaning more and 'down' meaning less (Newell and Proust, 2010).

Our foremost responsibility as creators of participatory models is to the people who will use them, not to the mathematical integrity of the algorithms they contain. Therefore the models cannot be only evaluated quantitatively, through testing stability, predictive capacity and variable ranges. Instead, they must be accepted and responded to by people, within social contexts, framed by power, knowledge, relationships and previous experiences. For this reason, the methodology for both creating and evaluating these models must be based in observation, critical reflection and consultation.

However, perhaps partly due to these 'softer' goals of learning and engagement, participatory model design methods have been dismissed as being 'anecdotal' and 'informal' (Norling *et al.*, 2013). Instead, I argue that these central tenets of observation, reflection and consultation provide strong support to learn from experience in a way that is structured and evidence-based. To demonstrate this, the next section outlines three design principles for creating a viable metaphor, which are grounded in previous field experience with participatory models as well as evidence from related literature. The principles are that models should be 1) recognisable, 2) playable, and 3) suitable. Each is elaborated in turn.

Recognisable

The first, and central, design principle is that a participatory model must be recognisable: that is, players can identify their world in the interface and parameters. This principle is roughly equivalent to the virtual reality principle of 'coherence', where simulated environments must 'make sense' to players (Fiore *et al.*, 2009). The importance of being recognisable is illustrated through a computer-assisted role-play game designed for use in Mexico's Caribbean coast. The model-game targeted regional level planning and conservation bodies, taking fishing and tourism as the two most important drivers of persistent reef degradation (Melbourne-Thomas *et al.*, 2011a; Melbourne-Thomas *et al.*, 2011b).

Representatives from local universities, natural resource management bodies and environmental NGOs attended a calibration workshop, and strongly criticised the gamified model as lacking two very important processes. Firstly, tourism investment does not follow the patterns of 'normal' markets, due to money laundering from the illegal drug trade. Second, we had not included hurricanes, which interrupt both fishing and tourism, and also significantly damage reefs. This weakened the model's believability and derailed conversations about feasible interventions for controlling the impact of mass tourism and

regulating fishing capacity. Significantly, however, participants did not question those elements of the model that were, in themselves, gross simplifications of regional time-series statistics into ball-park estimates of local socio-economic dynamics (such as tourism arrivals and employment) as these still appropriately reflected local trajectories of change –and were therefore recognisable (Perez *et al.*, 2009).

Playable

Participatory models must balance the ability to replicate known dynamics with opening up space to discuss and explore as yet unrealised futures. This leads to the playable principle, where the elements in the model should be the minimal structural elements necessary to give social, ecological and economic credence to the model, without placing undue restrictions on participants' creativity or ability to improvise. 'Playable' equates to a 'force' in game-design terminology (McGee, 2007) – too much freedom or too much structure leads to problems in play. In Mexico, all socio-economic dynamics were retrofitted to past data, and bound to the trajectories emerging over the previous three decades, seriously limiting the scope participants had to make unexpected or radical changes. On the other hand, clearly linking degrading reef health to the two most important economic activities, based on the best available government and scientific data, enabled frank discussion of future trade-offs that may be necessary. As illustrated above, model dynamics do not have to be 'precise', in the sense of fine-scaled, but do need to provide scaffolding to direct discussions and promote learning. Some elements of a model are fixed –immutable relationships that structure interactions. Others are open –able to be added to, experimented with, and even taken out completely.

The game should be designed to capture feedback loops between the collective and individual decisions of the players and the modelled responses of the relevant socio-ecological system. In practice, this means identifying biophysical and social points of interaction; and codifying these in ways that a) make sense to players in terms of their known reality (recognisable, as explored above) and b) reflect scientific understandings of 'how things happen'. A simple example is from fishing: when fishing rates are above population replacement rates, stocks fall and catches drop. The process of translating an observable characteristic from the 'real world' into a playable algorithm is called gamifying. It involves making careful decisions about what will be fixed and what will be open, according to the learning and engagement that designers wish to provoke.

Suitable

The final design principle is that of suitability: the model should represent reality at a scale that is compatible with one that the players can conceive acting in or influencing. If not, designers risk 'scenario rejection', where participants reject the premise of the game (Cameron *et al.*, 2011). For example, farmers may be able to change their cropping systems to adjust to climate change, but are unlikely to feel they have influence over setting international carbon emission targets, and may just respond with 'what's the point?'. This was again a retrospective lesson from the Mexican experience: tourism arrivals tend to respond to global economic trends far more than the decisions of state-employed conservation managers, the attendees of our workshop: the scale was unsuitable.

Following on, a 'suitable' model will allow players to make decisions and apply levers that actually exist for them, or make choices for which they may be able to lobby or campaign. This means asking three questions: 1) what decisions can be made; 2) what are the key parameters both affecting those decisions, and resulting from them?; and 3) what do stakeholders need to negotiate and learn from each other (e.g. management activities, conservation attitudes)? Answering these questions will provide the framing through which a suitable, playable and recognisable interactive model can be created.

Applying the three principles: the creation of ReefGame

The following section describes how the three principles of recognisable, playable and suitable were used to create a gamified participatory model for use with fishers and associated stakeholders: ReefGame.

ReefGame was designed and parameterised for use in one of the most overfished areas on earth: the Philippines. Despite a forty-year history of integrated coastal management interventions, nearly 70% of reefs in the Philippines are under very high or high threat from destructive and over-fishing (Burke *et al.*, 2012). The country's more than one million small-scale or 'municipal' fishers target the nearshore areas, including reef, mangroves and seagrass. These areas are managed by local government units (LGUs), which often have limited scientific, technical and budgetary capacity. Because of this, the marine conservation activities of LGUs commonly have reasonably marginal spatial and temporal impact (see discussion in Horigue *et al.*, 2012; Horigue *et al.*, 2016).

This context of weak governance and overcapacity is the backdrop for designing a viable metaphor using the design principles previously introduced. I now go on to apply the principles in reverse order –suitable, playable and recognisable.

Suitable

A suitable model offers the fisheries' stakeholders a chance to negotiate the levers that exist for them in everyday life. For example, while local fishers and governance units cannot hope to stop climate change, reducing local stressors is widely considered to be critical in reducing its impacts (Gurney *et al.*, 2013).

Working out effective and fair ways to encourage voluntary reduction of fishing effort is a central concern, given the key issues of overfishing and weak governance introduced above. We need to understand how to change the fishers' everyday decision whether to go fishing, or to do something else. This leads to simulating a world of declining catches, alongside a range of livelihood alternatives, and asking fishers to decide and discuss their livelihood choices. With this as the focus of the game, fishers, municipal authorities, potential employers and researchers alike will be able to explore the barriers and enablers to exiting the fishery.

As well as reducing fishing effort, stocks can be protected or enhanced – most often through Marine Protected Areas (MPAs) but also closed seasons, restocking programs and gear limits. Here, the key decision for authorities is what kind of mechanisms to implement and how to negotiate their successful deployment; for fishers it is whether or not to oppose, support and/or obey any restrictions imposed on them. Power and justice are important considerations here, as the impacts of regulatory actions are felt unevenly among resource users.

Therefore, the game will focus on fishing livelihoods, possible alternative livelihoods and marine conservation/stewardship.

Playable

Recall that the playable principle comprises two key aspects: constraint and creativity. Constraint refers to the socio-ecological boundaries within which players must operate. These boundaries are informed primarily by scientific knowledge from peer-reviewed literature or respected scientific organisations (see table 1). For example, different coastal habitats (e.g. corals, seagrass, mangroves) have different carrying capacities, and the fish that live there vary in size and value. Similarly, almost without exception, Philippine fisheries have experienced steady declines in catches due to overfishing (Burke *et al.*, 2012). Finally, overfishing, particularly in conjunction with other human-led stressors, can lead to phase shifts and radical declines in productivity (Pandolfi *et al.*, 2005). These, and other ecological parameters, and their gamified translations for ReefGame are in Table 1.

On the social front, constraints include local economic conditions. These govern what kinds of livelihoods are available for the fishers, at what pay, with what skills and accessibility. In addition, fishers are usually heads of household and are often responsible for ensuring enough cash income for their families to meet basic needs. How much fishers need depends again on local economic conditions, and the number of children they have. Fishers' abilities to exploit remaining stocks also rely on their access to gear and technology: well-resourced fishers with efficient gear will have larger catches, while smaller fishers' catches regularly drop below subsistence level (Cruz-Trinidad *et al.*, 2009; Ferolin and Dunaway, 2013).

Table 1 Gamifying coastal and reef ecology

Qualitative statement of ecological characteristics	Gamified translation	Supporting sources
Coastal areas are made up of land and sea areas. Key fishing-associated habitats are mangroves, seagrass and corals.	The game board is made up of land and sea cells. The sea cells can have habitat cards, picturing coral, seagrass and mangroves.	Burke et al. (2012)
Fishing reduces fish biomass, increasing the likelihood that a reef will switch from a coral dominated state to an algae dominated state.	When the biomass of fish on a coral-dominated reef cell reaches 50% of its initial value, the cell switches to algae-dominated.	Hughes et al. (2007) Fung et al. (2011)
Reef associated fisheries can be broadly understood and described through dividing fish into two groups: piscivorous fish (usually larger and higher value) and herbivorous fish (usually smaller and lower value)	The model includes two kinds of fish: 'big fish' and 'small fish'. 'Big' fish are worth four times as much as small fish, with prices corresponding to local markets.	Fung et al. (2011) Melbourne-Thomas et al. (2011a)
Due to overfishing, catches are declining in small-scale fisheries across the Philippines.	Populations on sea cells are big enough to initially support larger catches, but these fall off dramatically after a few rounds of fishing activity by players.	Burke et al. (2012) Lachica-Aliño et al. (2006)
Some habitats support more fish than others. In particular, some habitats have a greater proportion of larger, higher value species. Coral can support the biggest biomass, followed by sea grass and mangrove.	Each of the habitat cells has a maximum possible biomass, and a different ratio of small: big fish. 1. coral dominated – 100% of total possible biomass (60: 40) 3. seagrass dominated system – 50% of total possible biomass (80: 20) 4. mangrove – 37.5% of total possible biomass (90:10)*	Maynard et al. (2010) MacNeil et al. (2015)

*Note: Percentages for the reef-associated habitats were based on suggestions by Filipino marine ecologists (Dr P.M. Aliño and laboratory) based on field experience. Note that particularly the seagrass/mangrove ratios do not correspond with relative biomass reported by Rönnbäck (1999), for example. However, in the Philippines case, both seagrass & mangrove fisheries are associated with older fishers who prefer 'safe' (reliable and less physically taxing) gear, and acceptance of lower catches accordingly (Fabinyi, 2012). Local experience grounded in both field surveys and fisher

interviews is considered a more reliable indication of target fish abundance associated with the various habitats.

Creativity, on the other hand, refers to the ways in which the game can encourage innovation in the players. Initial parameters are guided by local conditions, for example the presence of tourism, mariculture and agriculture, but fishers and other players alike are encouraged to use their imagination in terms of envisioning alternative livelihoods. Livelihood projects often get bogged down in formulaic responses, with very little evidence of success (Sievanen *et al.*, 2005). Similarly, poor Filipinos are often viewed by development projects from a 'deficit' model, always focusing on what is lacking and needed, not assets and strengths (Gibson and Cameron, 2005). This results in circular arguments around poverty and 'last-ditch livelihoods' that are not constructive (Béné, 2003). Instead, the idea was to foster hope rather than stifle it with overly restrictive and narrow access to alternative livelihoods. This has three key benefits: firstly, it opens up the game to explore new futures, secondly it encourages the fishers to view themselves as agents of change rather than passive recipients of aid or handouts, and finally it enables non-fisher players to observe and reflect on social and cultural attachments to fishing, as financial and skill-based barriers to entering other livelihoods are not present in the virtual 'game-world'.

Recognisable

Adding to being suitable ('just the right scale') and playable (creative within boundaries), ReefGame also needed to be recognisable for its chosen audience. This means understanding the socio-ecological world of the small-scale fishers, and the organisations that exist in their communities, achieved by drawing on existing ethnographic and other relevant literature, and a wide-scale (n=~1000) household socio-economic survey across ten municipalities (see Muallil *et al.*, 2011, for details on survey findings). In addition, a Scenario Development workshop was held with fisheries stakeholders to compile information about what we needed to add to our basic model/game design, described above.

This process resulted in a range of adjustments to the game characteristics and parameters. Changes ranged from which livelihoods were available as default options to refining the dynamics of the offshore fisheries. Only some of these affected the algorithms in the underlying model, others just the 'look and feel' of the game. Similarly to 'playable' considerations, 'recognisable' parameters are only hardwired into the game where necessary. For example, in many areas of the Philippines, fishers do not go out during

monsoon, due to high winds and large waves. Coding this in is unnecessary as the gamemaster or facilitator can simply announce which season it is, and fishers make their decisions accordingly.

Table 2 gives examples and explanations of recognisable attributes of the game

Table 2 Designing a recognisable model/game

Known socio-ecological characteristics	Gamified translation	Supporting sources
Fishers are familiar with local coastal habitats, fishing grounds, and coastlines, and make fishing decisions based on this knowledge.	A physical game board is made up of sea cells (with or without habitats) and land cells, adjusted for each locale so it schematically resembles the coastline and habitat distribution.	Scenario development workshop Game et al. (2009)
Fishers can get the 'jackpot' – unusually or seasonally high catches commonly resulting from pelagic stocks moving through municipal waters.	Extra fish are distributed randomly across a number of sea cells at each time step, so it is possible for fishers to get high catches even where populations have fallen overall.	Hill et al. (2011a) Mangahas (2000) Veloro (1994)
Fishers use many types of gear, and strongly associate their fishing identity with the kind of gear/boat they use.	Four different types of gear are set in the game (traps, bagnets, hook and line and spears). Each is set with a unique maximum and minimum, based on local catch statistics.	Mangahas (2006) Fisheries survey (reported on in Muallil *et al.*, 2011; Muallil *et al.*, 2013)
Fishing is a highly uncertain activity, with catches showing substantial daily variability. Ideas of luck and skill are integral to fisher identity, and are used to explain this variability.	Catches for each round are randomised minimum and maximum, based on gear and local catch statistics (see above)	van Oostenbrugge et al. (2004) Veloro (1994) Mangahas (2000)
Fishers preferentially catch bigger, higher priced species.	70% of the allotted catch is taken from the carnivore/big fish pool (or as many as are available), and the remainder is taken from the small fish pool.	Lotze et al. (2006) Pandolfi et al. (2005)
A large proportion of fisher households have more than one breadwinner (whether spouse or older children). Alternative breadwinners help with subsistence activities and supplemental livelihoods.	After a few rounds of the game, a 'household' scenario is introduced, wherein players decide on livelihoods for two people instead of just one.	Graham and Sol (2004)
Fishers opt in and out of the fishery, engaging in a wide range of alternative livelihoods according to the meso-economic characteristics of their hometowns. Fishers particularly prefer livelihoods that allow them similar incomes to fishing, to enjoy the beauty of the sea, and to 'be their own boss'	A range of livelihoods is available as default options. This includes a number of 'sea-based' options, including aquaculture, boat tourism and ferry driving. In addition, fishers can set up their own businesses.	Muallil et al. (2014) Muallil et al. (2011) Scenario development workshop with fisheries stakeholders

Known socio-ecological characteristics	Gamified translation	Supporting sources
Fishers and local government units alike identify illegal fishing as a major issue, but are reluctant to blame locals or coordinate to improve compliance with fishery regulations.	Automated fishing agents, which catch large numbers of fish, can be deployed within the model. Their 'illegal' catches are reported on the game interface. This speeds up the rate of resource degradation, and allows discussion of this important issue without pointing fingers at particular people.	Fabinyi (2012) Scenario development workshop with fisheries stakeholders

ReefGame: summary of play

Compiling these design considerations resulted in ReefGame, a linked game and computer model for exploring alternative livelihoods and coral reef conservation in fishing communities. Game play is described briefly below, and in more detail in the manual, available from www.onefishtofish.com

The game board represents the coast of the modelled area, and is easily adaptable to different sites (see figure 1).

Figure 1 ReefGame board, showing numbered land and sea squares, marine habitat icons and model boats as player tokens

While fishers and other stakeholders play the game, a computer model calculates fish catches and the impacts of the players' decisions on marine habitats, as detailed above. The results of each round of the game are displayed on a simple graphical interface.

A facilitator, or game master, guides the game by explaining the roles, interpreting the interfaces (when necessary), introducing the scenarios and facilitating discussions and debriefing.

A range of stakeholders can use ReefGame in workshops with a recommended 10 to 30 participants. The main roles are for fishers, who can play singly or in pairs. Local

governments can play, aiming to keep a high public approval rating (based on the economic situation of the fishers) and a healthy environment (based on fish stocks and coral health). Tourism and aquaculture operators can be played either by respective representatives, or by NGOs, operating as employers and potential partners on any conservation activities undertaken.

ReefGame has four successive scenarios. Each introduces new interactions and decisions for the players. The first is fishing only, to familiarise players with the game, and allow them to see changes in catch volume and composition. Facilitators can introduce illegal fishers at any time during this, or other, scenarios. This can be used to spur discussion on how to control encroachment, and the impact of illegal fishing on the marine environment. Next is 'alternative livelihoods', where participants can decide either to continue fishing or to explore other options, as discussed above. Thirdly, 'household': players make livelihood decisions for themselves and another household member, allowing them to diversify their livelihood strategies. The final phase introduces management interventions, where local government players lead consultations and decision-making about management initiatives, for example marine protected area establishment or gear restrictions.

Discussion: a working viable metaphor and a viable metaphor that worked

Following the design process and a pilot workshop, ReefGame workshops were run across ten municipalities in the Philippines. Using a purposive sampling strategy, the sites were selected to have a broad range of meso-level economic characteristics, including different key industries such as tourism, mariculture, heavy industry/shipping and agriculture. Fishers, local government workers, NGO representatives and local employers attended the workshops. This diversity of sites and attendees allowed investigation of the adaptability of the model: was ReefGame a viable metaphor – playable, suitable and recognisable for a range of fisheries stakeholders? And would this viable metaphor generate the hoped for outcomes of education and engagement?

This section will briefly explore these questions, drawing from video data of around 200 fisheries' stakeholders playing the game during workshops, group debriefing sessions, and post-hoc interviews with both players and expert facilitators. The focus is on qualitative evidence, in accordance with Ravetz (2003) who argued the most significant

advantages of using interactive modelling tools is the discussions and arguments that they elicit.

Recognisable and playable: trade-offs for learning

Firstly, ReefGame was recognisable to the fisheries stakeholders who played it. Consistently across all sites, fishers justified their decisions through reference to local conditions, and talked about the gameboard as if it corresponded to their local fishing grounds. This helped discussions stay focused on overfishing, livelihoods and marine conservation. However, as we will explore in further detail below, the 'recognisability' did create trade-offs with our other principles, particularly 'playable'.

The playable principle exists primarily to direct discussions and promote learning. Specifically, ReefGame was created to help fishers understand overfishing, and the role of coral reefs in maintaining healthy marine systems. As Maynard et al (2010) point out, it is critical that fisheries stakeholders understand that healthy corals support more fish than degraded algal systems. ReefGame enables fishers to 'realise this for themselves' (words of a local manager), making it a much more powerful learning experience (Hills *et al.*, 2006). Take this typical interaction between participants:

Fisher A: "Patay nga ang corals, ngari wala akong nahuli dining isda" (The corals are dead, that's why I haven't caught any fish.)

Fisher B: "Ah ganun" (Ah, that's why.)

A number of players realised that protected areas and other conservation mechanisms were not merely a device to unfairly exclude fishers: as one fisher put it: "Para din sa amin yun e" (It [the Marine Protected Area] is for us as well). Conflict over the acceptance of Marine Protected Areas is common in the Philippines, even after 40 years of Community-Based Natural Resource Management interventions (Gollin and Kho, 2002). Fisher support is critical for MPAs to succeed, especially where enforcement is ineffective or limited (Ban *et al.*, 2009). ReefGame enabled detailed discussions about the purpose and the science behind MPAs, where fishers were able to ask questions based on their observations of falling catches, and declining coral cover, both within the game and from their own experiences.

However, learning was not universal, and sometime unhelpful lessons were inadvertently transmitted or reinforced, particularly where 'recognisable' parameters were concerned. For example, the addition of 'illegal fishers' as automated entities in the game, as requested by stakeholders in the participatory design workshop, meant that fishers did

not always have to confront the sobering fact that evidence points to overfishing in all study areas (Muallil *et al.*, 2014), irrespective of the legality of gear used. It is a tightly held belief across many fishing communities that 'illegal' gear is the principal culprit for falling catches and reef degradation (Fabinyi, 2012). Disrupting this belief to help fishers reorient to the urgent need for alternative livelihoods and marine stewardship would be an important step towards effective conservation and, hopefully, poverty alleviation. Retrospectively, whilst the 'illegal fishers' helped prompt discussion on regulation and enforcement, the provision of an in-game scapegoat was not particularly useful, especially as blame regularly turned to 'outsiders', including particular migrant or nomadic groups.

Whilst the 'illegal fishers' (described above) tended to entrench rather than challenge the small-scale fishers' belief that environmental degradation is largely the responsibility of 'outsiders', it did spark interest in, and calls for their local government to start putting programs in place. For example:

Fisher A: "Kailangan na kuwang magtayo ng…" (Now we need to set up a…)

Fisher B: "Mag-Bantay Dagat tayo" (Let's have a coast guard)

This meant that, despite quite lowly wages, especially in comparison to other livelihood activities within the game, the coast guard positions were usually filled. Fishers negotiated benefits for the Bantay Dagat (coast guards) with tourism representatives and the local government unit, rightly arguing that they were providing a social service in protecting reefs from encroachment.

Another problem emerged in an area that was not yet showing drastic signs of overfishing. Here, in order to make the model recognisable, we matched fishing catch capacity in the game to current reality. However, doing this meant that catches did not drop off in any tangible way, even after multiple rounds of fishing. Therefore the decision to move away was not an economic necessity, and far fewer fishers took up the option in those sites. In choosing to not disrupt local fishers' current experience of the marine environment, we lost a valuable opportunity to confront and discuss the prediction that the area's fisheries are among the most vulnerable in the country to rapid decline (Villanoy *et al.*, 2010). Participatory models should take us into an uncertain future, not remain in a stable present, and it may be necessary to compromise 'recognisability' in order to achieve this. Where rapid declines in catches and reef health occurred in the game, as in other areas, fishers tended to be more innovative, more outspoken and more interested in the

science and rationale behind proposed methods for recovery, such as marine protected areas and closed seasons.

Merely mimicking current ecosystem states when parameterising the game for each of the field sites meant we lost the opportunity to demonstrate the effects of overfishing. The trade-off is between 'recognisability' and 'playability'. When initial catches are much lower than fishers' real experiences, the game loses traction. However, not having catches decline in a noticeable way within game-play meant not advancing understanding of the overfishing problem that affects almost every small-scale fishery in the Philippines. Achieving a middle ground enables both acceptance and learning and requires a careful balance between these two principles.

Despite these reservations, in all sites participants expressed gratitude for the ReefGame's contribution to knowledge sharing and relationship building across the different sectors. One NGO representative explained it thus: 'it's not often that scientists come out and take the time to really talk to us'. Indeed, as Ban and colleagues (2009) claim, the usefulness of tools like ReefGame largely lies in helping canvass solutions and stimulating discussions in ways that are otherwise difficult.

Facilitators readily identified that the most significant advantage of using ReefGame over more standard delivery of educational materials was its ability to keep fishers engaged. As one noted: 'normally in workshops at least some of the participants get bored and wander outside for a cigarette, but in ReefGame everyone stays around the table'. It was telling that many groups asked to keep playing, rather than exiting with relief, when meal breaks were called: ReefGame's playability made it a successful communication tool.

Suitable: creating a rehearsal space for negotiation

Finally, ReefGame's suitability, its focus on issues that were relevant and accessible to local actors and actions, meant that workshops could relate game negotiations to 'real life'. For example, local government unit representatives clearly saw how consultation, or a lack of it, could greatly help or hinder implementing fishing regulation and reef protection. One standout example was where initially government representatives had been openly rather rude and aggressive with fishers, accusing them of not understanding the need for conservation. This resulted in fishers declaring mutiny, and threatening a 'strike'. In later rounds, the representatives tried for a much more conciliatory approach, offering training and social security benefits in exchange for agreement to a closed season. This demonstrates how the game offers a safe 'rehearsal' space for fishers and local

governments alike to try out strategies to elicit cooperation and desired outcomes. Negotiating access rights, and openly acknowledging the trade-offs for livelihoods inherent in closing areas of the fishery, are critical for social justice and successful coastal management (Fabinyi *et al.*, 2013).

Incorporating fisher voices into policy discourse is an important step to popularly accepted fisheries' regulation (Cinner *et al.*, 2011). With over seven thousand islands and endemic problems with effective governance at all levels of the State (Gollin and Kho, 2002), the Philippines does not have strong enforcement capacity. Building trusting relationships between scientists, fishers and regulators is therefore critical – compliance relies on fishers adopting behaviours that support conservation and existing fisheries regulations. This can happen if open conversations about the rationale behind initiatives such as closed seasons are possible. One example of where this took place was after heated discussions during ReefGame about the negative effects and uncertain benefits of a closed season implemented by the local government unit during 'Management rounds'. In a debriefing session, fishers were able to ask questions of an attending fishery scientist, helping them understand the reproductive biology of one of their target fish species. Fishers' confidence with this scientist had built up over the two days of game play, and they were able to match their own experience catching juveniles with what they were told. Local government representatives observed that the fishers were eager for knowledge and willing to listen – if they were in turn listened to.

Effectively involving fishers in education, outreach and decision-making is not just important from a social justice perspective. As Fabinyi and colleagues (2013) assert, small-scale fishers have the power and influence at the local level to seriously derail attempts to implement restrictions on the fishery. Local Government Units got a taste of this during 'Management' rounds, as discussed above, where they tried to establish protected areas. Fishers protested the loss of their fishing grounds and confronted Local Government Units about their attitudes and complicity in corruption and the non-apprehension of encroachers using illegal gear. Inevitably, negotiations resulted in compromises: smaller areas, the introduction of 'traditional' fishing gear within exclusion zones, and better conditions/incentives for the voluntary coast guard programs: important steps to community acceptance and adherence to fishery management strategies.

Conclusion

Facilitating learning and dialogue amongst stakeholders is critical to overcome sustainability challenges. At the same time, influencing how communities respond to both diminishing resources, and attempts to conserve that resource, continue to be the Achilles heel of environmental management. Tools must be able to flexibly adapt to local circumstances and emerging issues, in order to facilitate both learning and engagement.

ReefGame's design did this by following three principles to create a viable metaphor for fisheries stakeholders. The game was playable: it allowed stakeholders to create and improvise within bounded rules that reflected ecological realities. ReefGame was suitable: participants took decisions that related to their own lives. Finally, it was recognisable: fishers and other players related the game to their realities, and made their decisions with reference to these realities.

The game bridged a communication gap for fishers in developing countries, while also testing and improving both scientists and local managers' skills in facilitation and negotiation. Having to persuade resource users to agree to conservation measures, albeit in an 'artificial' environment, gives these participants an opportunity to practise their communication skills, and provides useful insight into what strategies are more likely to succeed in 'real' life. The game helped stakeholders explore novel and effective means of reducing fishing effort through incentives and enforcement that can be implemented and sustained at the local level.

Using a principles-based design process is a useful step towards improved application of models in participatory settings. As discussed, participatory models often fall into a single-use trap or are too complicated to be useful to community groups. The fact that 'ReefGame' has continued to be used as a learning and communication tool, both in other projects and by the University of the Philippines, is a strong indication that the design approach helped us avoid both of these outcomes. Further, an ethic of critical reflection on the shortcomings and trade-offs involved in the design and implementation of participatory models will help improve outcomes in the future.

3. Playful shift

Knowledge culture	Sources of evidence	Sources of dismissal
Expert 	Measurement Observation ("solid contribution to the literature")	Jargon, Irrelevant Inaccurate ("what has the game got to do with reality?")

Adapted from Brown (2004; 2010a; 2010b); comments from peer review in brackets.

Overview

Unlike the previous paper, *Playful shift* had the easiest time traversing the peer review system, as it is written squarely within a disciplinary expert knowledge culture and, as a reviewer wrote "makes a solid contribution to the literature". Indeed, speaking directly to the 'exiting the fishery' and 'alternative livelihood' literature, the paper makes a methodological argument for exploring both these phenomena through the lens of 'quasi-experimental field games' (i.e. ReefGame) by demonstrating how insights derived from the fishers' decisions in the game can complement more standard survey-based and ethnographic analyses.

I argue that not only does ReefGame allow these empirical observations, but it is also useful from a relationship and trust-building perspective, and that such face-to-face encounters between different groups are crucial for progress towards conservation goals. This argument integrated the community and organisational knowledge cultures with the expert perspective of the paper. Neither of the reviewers commented on this, indicating that this paper succeeded in transcending the expert and community knowledge divide more painlessly than the previous paper, *Viable metaphors*. On the basis of this experience, it seems sneaking in small aspects of 'transdisciplinarity', through what McKinnon calls "quiet subterfuge" (2016: 347) may be a more successful strategy to shift the boundaries of disciplinary conversations than tackling them head-on.

This paper was not without inter-disciplinary challenge, however, with a reviewer questioning the epistemological validity of extrapolating from the game to 'reality'. To address their concern about what is usually known as 'external validity' (the ability to generalise from an experimental game to a broader 'natural' situation (Jackson, 2012b)), I added further justification of the methodology in the introduction alongside the already existing discussion of how to relate game play to 'real life'.

I did (gently) note, however, that any hypothetical survey set-up, like those common in this field, have the same problem of the potential difference between what people say

they would do and what they might 'actually' do (or indeed, what they said they did, and what they 'actually' did), which is rarely addressed or commented on. The idea of a stable, external 'reality' with which data have a determinable relationship is a fundamental pillar of quantitative social science. This presumed stability (and separation) is called into question by 'playful' methods, like ReefGame, that blur often unquestioned categories of 'natural' versus experimental versus pedagogical contexts. The theme of game as part of, and constituting, reality is picked up again in *Rehearsing inclusion*.

Paper – A playful shift: Field-based experimental games offer insight into capacity reduction in small-scale fisheries

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Abstract

Understanding how to effectively and efficiently reduce fishing effort is a marine conservation imperative, given falling catches, degrading coastal systems and burgeoning human populations. Globally, studies into understanding who may leave a fishery, and why, have tended to be survey based, offering important but limited insights into exit behaviour. At the same time attempts to introduce alternative livelihoods to fishing communities in developing countries often fail, and fishers are hostile to efforts to implement regulatory restrictions on their fishing activities. This paper argues exploring shifting behaviours through quasi-experimental field games offers inroads to this dilemma. Firstly, such games can triangulate with both observational and survey-based data to deepen understanding of how and why fishers may exit the fishery. Secondly, face-to-face interaction and stakeholder participation are important for improving natural resource management, and are facilitated by games. I illustrate these points using the example of ReefGame, played in multi-stakeholder workshops with small-scale fishers across the Philippines. Characterizing players as 'shifters', 'intermittent shifters' and 'non-shifters' highlights how non-economic considerations, meso-economic contexts and desires for the next generation to have 'a better life' can inform more responsive and effective fisheries management. At the same time, the game offers structured opportunities for scientists, managers and fishers to interact, building trust and understanding between them.

Introduction

As global fisheries crises deepen in spread and scope, researchers are attempting to shed light on how and when fishers decide to leave fishing as a livelihood (Ikiara and Odink, 1999; Pascoe *et al.*, 2014). Understanding who is likely to leave can help design efficient and effective capacity reduction programs, and help managers decide whether to focus on resource enhancement (e.g. restocking), fishery restrictions (e.g. no-take areas and gear/size limits) or facilitating exit (e.g. licenses and alternative livelihood support)

(Aliño *et al.*, 2002). Recent studies have focused on surveying current fishers to determine demographic characteristics and other factors that lead to fishers being more or less likely to stop fishing. Fishers answer questions about catch sizes, income, alternative livelihood opportunities and satisfaction with fishing, to determine exit thresholds and motivations (e.g. Muallil *et al.*, 2011; Pascoe *et al.*, 2014). These studies have offered a range of useful insights that tend to confirm the 'stickiness' of fishing as an occupation (Chuang and Lee, 2000). That is, there are economic, social and cultural barriers to leaving fishing, which means that a decision to do so is anything but straightforward (Pollnac *et al.*, 2012). This is particularly true in developing countries, such as the Philippines, where fishing is strongly associated with socio-cultural identities and suitable alternative livelihoods are likely to be in short supply.

These survey findings are confirmed by longer-term ethnographies into fishing communities. Studies by scholars such as Maria Mangahas (2000), Cynthia Zayas (Ushijima and Zayas, 1994), and Michael Fabinyi (2012), working in the Philippines, demonstrate that fishing identity is woven in with cultural histories and narratives of social justice and rights to livelihood. Interference with that right, through restrictions on fishing, is often met with suspicion and resistance (Fabinyi *et al.*, 2013). Although narratives of 'participatory' fisheries management abound, examples of long-term success in this area are thin on the ground (as argued strongly by Gurney et al. (2014), and earlier by Gollins and Kho (2002)).

Indeed, 'conservation for development' projects in developing countries have a reasonably long history of trying, and often failing, to encourage fishers to leave the fishery through setting up alternative livelihood projects (e.g. Hill *et al.*, 2011b). While well-off countries, such as Australia, have achieved relative (although mixed) success in reducing fishing capacity by licensing buy-back schemes, these regulatory mechanisms are costly and unlikely to be possible in a less affluent setting such as the Philippines (Minnegal and Dwyer, 2008). The combined effect of strong attachment to fishing and ineffective interventions means fisher numbers continue to climb, despite falling catches and persistent poverty (Muallil *et al.*, 2014). Furthermore, the impacts of overfishing and exclusion from the fisheries are felt unevenly across fisherfolk, with status, class and ethnicity playing key roles in governing both privileged access to the fishery and socio-economically feasible avenues into other occupations (Knudsen, 2016). It seems, then, that there is a gap between our understanding of the 'stickiness' of fisheries, conservation project-based expectations that alternative livelihoods will necessarily reduce fishing

effort or poverty, and the reality of a policy environment in which there are limited economic resources to either persuade or coerce fishers away from fishing.

Indeed, the relationship between non-fishing livelihoods, fishing pressure and poverty is far from straightforward. The livelihood diversification argument suggests that reduced dependence on extractive activities enhances household resilience against scarcity and alleviates pressure on the resource (Salayo *et al.*, 2012). While empirical evidence supporting this is mixed (Slater *et al.*, 2013), the emerging focus in both theory and practice on 'wellbeing' highlights the importance of diverse and sustainable livelihoods for small-scale fishers (Weeratunge *et al.*, 2014). Further, these authors have strongly argued for integrating considerations of power, policy and governance together with the needs, freedoms and quality of life of fisherfolk and their households, underscoring the importance of understanding fisher behaviour in its local context (Coulthard *et al.*, 2011, p453).

Quasi experimental field games can help to build understanding in this complex space. Like lab-based exercises, quasi-experimental field games consist of a set of activities wherein participants make choices based on the phenomena of interest, in this case, exiting the fishery. Where they differ, however, is they are played with resource users themselves and involve unlimited communication and discussion between participants. These games take as given that when your real life looks like your game, then the results from your game look like real life (Antonovics *et al.*, 2009). Furthermore, quasi-experimental games relinquish the laboratory's "neutral framing" in favour of adaptive game play in dialogue with participants. This is described by Le Page and colleagues (2016) as "a necessary weakness to elicit more realistic collective behavioural patterns". In this way, the methodology is highly contextualised and unrestricted, as compared to the decontextualised and restricted setting of traditional experimental games, which only allow participants a narrow set of predetermined choices. Triangulating game decisions with: a) testimony from players (in the form of verbalized justifications for their decisions which relate to 'real life' conditions and contexts); and b) comparison with both theoretical and empirical results from other studies, contributes to the rigor and applicability of results to 'real life' contexts (Jackson, 2012b; Jimenez-Buedo and Miller, 2010).

While seeking to avoid the defensiveness so often found in the experimental game literature (Mayo, 2008), I want to emphasize the potential advantages of this methodology in exploring pathways away from the fishery. Experimental games "can produce valuable surprises to unsettle assumptions and generate research questions, and they can challenge

assumptions in economic and social theory. They prompt re-examination of important and taken-for-granted ideas,…reflection and debate" (Jackson, 2012b, p85). A key advantage over surveys is that ethnographic research tends to suggest that fisher identity is constituted socially, so understanding how social interaction may facilitate exit (or not) addresses a key dimension of behaviour (Fabinyi *et al.*, 2013). Similarly, it enables triangulation with insights from previous studies, particularly by examining the hypothesis that moving fishers out voluntarily is likely to be difficult and not necessarily economically driven (Pollnac *et al.*, 2012). Finally, playing a game across areas with different labour options outside the fishery helps to identify sectors that could become priorities for linking in with locally available employment options, rather than 'inventing' unviable alternatives like the seaweed farming so beloved of conservation for development projects (for a strong critique of this tendency, see Sievanen *et al.*, 2005). Overall, it is suggested that expanding the methodological toolbox beyond surveys and ethnographic studies to include quasi-experimental field games will help develop and link findings, adding to the collage of knowledge around how to successfully manage depleted fisheries.

In addition to offering expanded insights, dialogue-based research methods should be a central tool of sustainable development researchers. The weak links between research into depleted fisheries and inroads into sustainability or poverty alleviation were introduced above. In direct contrast, the link between interpersonal trust, face-to-face interaction and effective management is clear, albeit complex (Ansell and Gash, 2008; Davenport *et al.*, 2007). For this reason, researchers should prioritize opportunities to communicate with resource users and managers in a manner that does not solely or primarily revolve around data extraction (Roux *et al.*, 2006), but rather encourages and builds mutual respect (Braithwaite, 2009). While a review of the extensive trust literature is outside the scope of this paper, there is strong evidence that compliance, collective problem-solving capacity and coordination are improved through increased trust, and a key pathway to increased trust is facilitating face-to-face interaction (Hering, 2016; Ostrom, 2006). Therefore, the benefits of running dialogue-based exercises, such as games, exist over and beyond any insights garnered, and the reader is encouraged to keep this in mind through the exploration of insights gained through bringing people together to play.

Materials and methods

The focus of this paper is five games played as part of a 2010 project called 'Finding a Way Out for Depleted Subsistence Fisheries in the Philippines', using a quasi-experimental field game. 'ReefGame' was developed to elicit the decision-making processes of fishers and engage them in a dialogue to explore ideas of alternative livelihoods. ReefGame is a computer-assisted board game designed to explore exit/shifting behaviour and marine conservation in small-scale fishing communities (Cleland *et al.*, 2012). It was used across the Philippines in various workshops between 2007 and 2011, and continues to be used as a learning and demonstration tool in professional graduate courses at the Marine Science Institute of the University of the Philippines. The game was deliberately responsive: to explore place-based attachment to fishing, and for the game to be accepted as representing reality in a meaningful way. The next section describes ReefGame and gaming workshops, followed by an analysis of how fisheries stakeholders played the game, and what this might imply for better resource management.

ReefGame description

Up to ten players, or player pairs, take on the role of fisher and head of family. Each has a boat token, a harbor (a square on the game board that serves as their 'base') and a fisher profile. The profile details their boat type (motorized or non-motorised), gear (net, bag net, spear or line), and family size (2, 3 or 4 children). As each fisher has different assets (type of boat/gear) and family sizes, income generating potential and expenses are different for each fisher. Each fisher's objective is to earn enough to meet their family's expenses through fishing and other livelihood activities. The game is facilitated by a game master, who explains the rules, decides when to introduce the different scenarios and mediates discussion.

The ReefGame board has both land and sea cells. Some sea cells have habitat cards, including coral reef, mangrove and sea grass. Land cells include the fishers' harbors, and alternative livelihood options (Figure 1).

Figure 1: ReefGame board showing player tokens, land and sea cells, and habitat cards

While fishers and other stakeholders play the game, a computer program calculates fish catches and income. Initial fish stocks are based on local habitat surveys and catch statistics. Each fishers' catch is randomized within limits imposed by their gear/boat type, and the number of fish left in their chosen fishing zone. These limits are calibrated with local catch statistics so the game resonates with players' experiences in the fisheries –a point discussed further below. The results of each round of the game are displayed on a simple graphic interface (Figure 2).

	Combined catch		Income – main player			Income - household player			Totals	
	Small fish	Big fish	Fishing income	Alt. livelihood	Collect pay from:	Fishing income	Alt. livelihood	Collect pay from:	Total income	Household expenses
Player 1	7	3	0	300	Market	715	0	Fish buyer	1015	-300
Player 2	11	5	0	300	Market	1185	0	Fish buyer	1485	-250
Player 3	0	0	0	300	Market	0	250	Market	550	-300
Player 4	12	8	360	0	Fish buyer	880	0	Fish buyer	1240	-250
Player 5	3	2	175	0	Fish buyer	115	0	Fish buyer	290	-200
Player 6	4	5	265	0	Fish buyer	50	0	Fish buyer	315	-200
Player 7	1	1	45	0	Fish buyer	-60	0	Fish buyer	-15	-300
Player 8	18	8	4740	0	Fish buyer	1060	0	Fish buyer	1800	-250
Player 9	15	6	725	0	Fish buyer	845	0	Fish buyer	1570	-200
Player 10	7	3	0	300	Market	745	0	Fish buyer	1045	-200

Figure 2: ReefGame interface (translated from Filipino/Tagalog)

In ReefGame, alternative livelihoods –opportunities to exit the fishery –are introduced in successive phases. At the beginning of the game, all fisher players can only fish, choosing a 'sea' cell as a destination. These initial rounds primarily serve to familiarize the players with the game. Following on, participants can decide either to continue fishing or to explore alternative livelihoods. Pre-programmed options include: aquaculture caretaker, construction worker, ferry crew, taxi/tricycle driver, tourism worker, and farm

worker. These can be added to or modified according to locally-available opportunities, and the imagination of the players and facilitators. In the final phase, each fisher player gets an extra player token, and begins making livelihood decisions for another household member (which can be a spouse or child; in the Philippines games it was usually assumed to be the child). This step allows players to diversify their livelihood strategies. The decisions made for this extra player token during these final rounds are called 'household players'.

A more detailed description of the game, including how it can promote learning and engagement around other marine conservation issues can be found through www.onefishtofish.com

Participants and game sessions

Study sites were purposefully chosen to represent a wide range of meso-economic characteristics, while still being accessible from Manila. This was to capture a broad range of fisher behaviour, as influenced by local economies. In addition, each workshop had the same 'framing activities', same facilitators, workshop format and participant recruitment strategy, providing a consistent backdrop for the game-playing. Therefore, the games had no obvious differences in presentation and interpretation by players (and see Jackson 2012 for an argument about the weaknesses of any claims of 'neutral' framing).

The games were played with participants hailing from six municipalities in the Philippines: Batangas City, Mabini, El Nido, Puerto Galera and Lubang Island (Lubang and Looc municipalities). Table 1 summarizes each municipality's socio-economic characteristics, showing the most important employment opportunities, and the importance of fishing to the local economy.

Table 1: Case study sites and characteristics

Municipality	Main industry	Approximate population*	Fisher population (% of total)*
Batangas City	Heavy industry	295 000	0.38%
El Nido	Tourism and Fishing	30 000	10.70%
Lubang	Agriculture and fishing	28 000	2.95%
Looc	Fishing	11 000	7.85%
Mabini	Heavy industry and Tourism	41 000	1.90%
Puerto Galera	Tourism	28 000	1.19%

*2007 figures (based on Muallil et al., 2011)

Each game involved at least 10 actual fishers taking the role of fishers in the game. Extra fishers formed player pairs where necessary. Participants from local government, NGOs and industry took up the other roles respectively (see Table 2 for breakdown for each workshop). Participants played the game across four sessions, during two-day workshops held around the theme of marine conservation and fisheries capacity reduction. Due to differences in how long rounds took, each workshop had a different number of rounds: the impact of this is discussed further below.

Table 2: workshop participants

	Total	Fishers	LGU	Other *	Number of rounds
Batangas City	23	18	3	2	17
El Nido	30	15	6	9	10
Lubang/Looc (combined game)	29	19	6	4	10
Mabini	19	10	6	3	13
Puerto Galera	26	18	4	4	9
TOTAL	133	80	25	22	59

*includes representatives from philanthropic organisations, regional governance bodies, other NGOS & related industries

The Local Government Unit (LGU) recruited all participants. Despite requests to bring in 'unorganized' fishers –that is, fishers that did not belong to local management groups, cooperatives, local conservation projects, or the volunteer coast guard (against illegal fishing/encroachment) – this did not occur. This means that in some ways our participants were 'best case' –people already concerned about the decline in marine ecosystem health, and involved in efforts to improve management. How this played out in terms of player strategies, and insights into shifting is discussed further below.

Data collection and analysis

The focus of this paper is on the livelihood decisions made in the games, that is whether players decided to leave the fishery, temporarily or permanently. Each game round involves each player deciding where to place their player token, whether fishing (sea cells) or alternative livelihoods (land cells). Each decision was recorded, along with the income earned for that round. In addition, the game sessions described above were video recorded and transcribed to capture player interactions, debriefing and decision making justification. These qualitative insights are used to triangulate the quantitative

findings, where triangulate means not just to corroborate, but also to deepen and, where appropriate, challenge or contest (Bazeley, 2004).

Note that the focus of the quantitative representations of data in graphs and tables is on overall patterns and ranges, rather than on representativeness and significance. This is to draw attention to the scope and nature of possible insights from playing this game, not to make definitive statements on likely exit behaviour from the field sites, which is not possible with the limits of our sample. In a similar vein, qualitative examples are chosen selectively and pragmatically, to illustrate aspects of what is observable (or not observable) in the graphs. This helps avoid the retrospective speculating so common in the standard decontextualised experimental game literature. As the players verbally justified and discussed their decision making with regard to game and 'real life' contexts, this evidence is drawn on to explore how to apply game insights to fishery capacity reduction policy and planning.

Results

Firstly, I make some comments on global level outcomes, to facilitate a broad understanding of what happened in the games. Then, I move to individual trajectories and create a typology based on game strategy to understand the games at a more detailed level. Each game is briefly described, followed by a general discussion of findings, limitations, and scope for further research.

Overall exit behaviour

To compare the likelihood of any one fisher deciding not to fish, we can take the percentage of non-fishing decisions made from all potential non-fishing decisions. A non-fishing decision is only possible from the introduction of alternative livelihoods into the game after the introductory 'fishing only' rounds. For example, in Mabini participants played six rounds with alternative livelihoods. Therefore, there were 60 possible decisions to not go fishing over the ten players (10 players x 6 rounds). Across all six rounds, only three alternative livelihoods decisions were made (by three different fishers), so the percentage of non-fishing decisions was five per cent. The non-fishing decisions percentage for all games is shown in Table 3, remembering that household players are the 'children' introduced in the final 'household strategy' rounds, where each player gets to decide on livelihoods for two members of their 'family'.

Table 3: percentage of non-fishing decisions made, per game

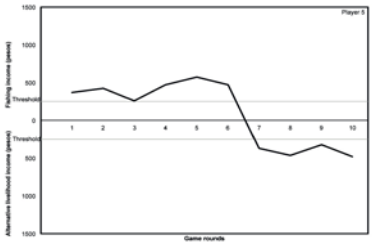
	Main players	Household players ('children')
Batangas City	29%	72%
El Nido	53%	85%
Lubang/Looc	7%	74%
Mabini	5%	98%
Puerto Galera	56%	95%

As demonstrated by Table 3, most fishers chose to fish, most of the time, across most of the games, even when alternative livelihoods were on offer. Whether fishers were making enough money did not determine whether they made more (or less) fishing decisions – the richest (Lubang/Looc) and the poorest (Mabini) fishers had far lower rates of non-fishing decisions (7% and 5% respectively, compared to 29-56% in the other towns included). Notably, most household players (characterized as 'children' in the game) were deployed in non-fishing livelihoods (72-98%), irrespective of how likely the main player was to fish or not. This is particularly striking in the cases of Lubang/Looc and Mabini, which had main player non-fishing rates of up to ten times lower than other towns. The implications of this for policy programs for 'the next generation' of fishers is discussed further below.

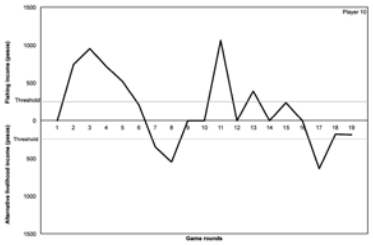
Individual strategies

Three strategies capture the behaviour of all players: a) Shifters, meaning that after alternative livelihoods were made available, players shifted away from fishing, returning a maximum of once in the rest of the game; b) Partial shifters, those who shifted away from fishing at least once, but returned to fishing; and c) Resisters, those who did not try alternative livelihoods at all. Figure 3 shows an example of each of the strategies, drawn from real players.

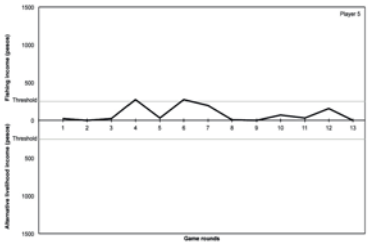
Note it was reasonably common for 'shifters' to shift back to fishing in the ultimate or penultimate round in the game. This pattern is consistent with the importance of gambling identified in small-scale fishers in a number of related studies (Mangahas, 2000; Veloro, 1994). Players who took this chance on a 'final jackpot', but otherwise consistently engaged in alternative livelihoods, were still considered 'shifters', to separate them from those who more consistently zig-zagged between fishing/non-fishing.



Shifter: this player successfully met their family's needs (shown by the grey 'theshold' line') both when fishing (above the x-axis), and not fishing (below the axis)



Partial shifter: this player intermittntly met their family's needs, as they had many zero income fishing rounds. They shifted between fishing (above the x-axis) and non-fishing (below) twice in the game.



Resister: this player only managed to meet the minimum needed by their family twice in the game (rounds four and six), as all their other catch incomes are below the threshold. They did not try alternative livelihoods.

Figure 3: Examples of different player strategies and their results

Below x-axis is alternative livelihood earnings, above is fishing earnings. The graphs show player income (in Philippine pesos, the game currency) per round. Income above the x-axis represents fishing income, while income below the x-axis represents alternative livelihood income. A threshold line at 250 pesos is the approximate point below which fishers are not able pay their family's expenses in the game (the actual threshold ranged from 200-300, depending on the player's profile, see above). This means the further away from the x-axis, the more income. Where fishers received negative income from fishing, due to travel expenses amounting to more than catch value, negative income was rounded to zero.

Figure 4 shows each of the ten players' income per round for each of the games, divided into the three strategies. Three global observations are relevant here before examining the games one by one.

First, the five games did manage to capture a wide range of possible outcomes, given the strategies identified: almost everyone shifting, almost nobody shifting, and an even split between the three. This tends to suggest the purposive sampling aim of capturing the range of player behaviour was met, despite the limitation in only recruiting 'organized' fishers mentioned above. The different patterns observed also follows findings that site characteristics strongly influence fisheries exit behaviour (Daw *et al.*, 2012).

Second, game settings did not force individuals into responses. Players with identical assets (boats, gear) and household expenses (as per their player profile) were almost exactly evenly distributed across the three strategies across all games. This does not question or undermine findings that wealthier, higher status fishers respond differently to declining catches and the availability of alternative livelihoods, when compared to low status, poorer fishers (Knudsen, 2016), but rather that other considerations were driving decisions in the game. As Daw and colleagues (2012) note, multi-scalar effects of local development contexts, access to markets, individual catches and household wealth interact to produce different patterns depending on the scale of analysis. Within

ReefGame, however, it is more significant to show that players were not driven by their fictional characters (with their associated boat, gear etc.), without negating the importance of these social traits in 'real life'.

Third, across all games, successful and unsuccessful fishers were evenly represented among 'shifters' and 'resisters', adding substantial weight to the idea that non-economic considerations drive exit behaviour.

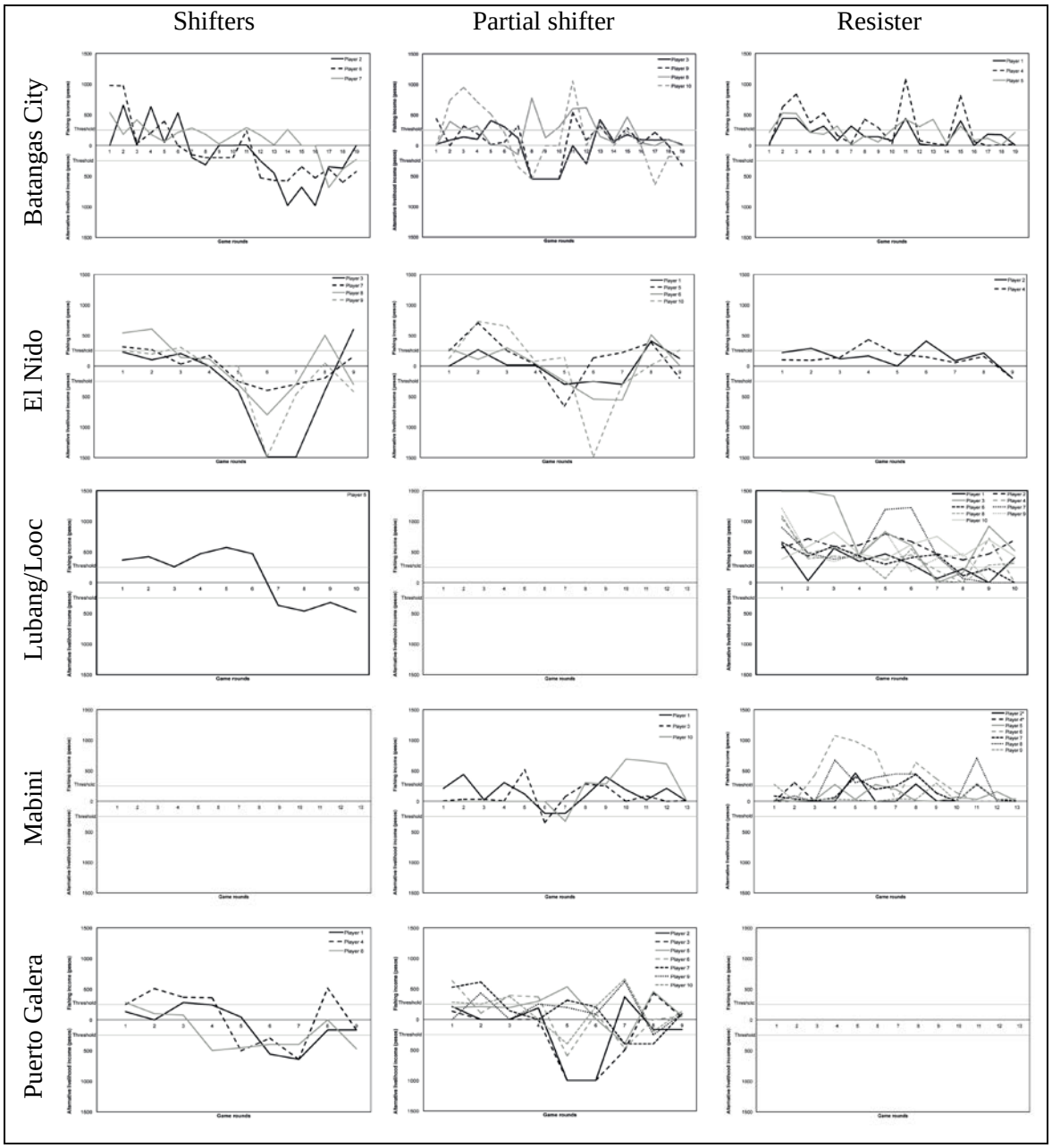


Figure 4: Strategies by game for main players only (showing income for each round for each player)

Below the x-axis is alternative livelihood earnings, above the x-axis is fishing earnings. The threshold line at 250 pesos is the approximate point below which fishers are not able pay their family's expenses in the game. Note that as different numbers of rounds were played in each workshop, the scale of the x-axis is variable –the implications of this are discussed in further detail below.

Discussion

Batangas City: autonomy and fishing

Batangas was the most evenly distributed of the games, with 3-4 players in each category. All fishers, irrespective of category, experienced fluctuating fortunes, with incomes consistently dipping below the income threshold necessary to sustain their game 'family'. Of the resisters, note the final four rounds saw no-one earning above the threshold, pointing to the attachment to fishing being stronger than economic or even 'game-playing' considerations. Two thirds of players at least tried alternative livelihoods. These results demonstrate that both 'poor' and 'rich' fishers attempt alternative livelihoods – note the example of two partial fishers, player 10, who shifted prior to experiencing any below-threshold catches, versus player 9, who mostly had on or below threshold catches before shifting.

A notable characteristic of this game was the relatively late onset of shifting, and the fishers' choice of livelihoods. In this game fishers claimed their reluctance to shift when livelihoods were first introduced was because the only jobs on offer were ones where they could not 'be their own bosses'. This led to the introduction of 'small businesses' on the second day of the workshop, where players' were asked to pitch their business idea to local government players. If successful, they paid a small registration fee and set up a range of activities, including opening a bar and a micro-piggery. About two-thirds of the players took up this 'small business' option, with a number putting their 'children' (household players) in charge, while they continued fishing. Micro-enterprise has not been particularly successful in alternative livelihood projects (Weber *et al.*, 2011), but projects have tended to be ad-hoc, poorly supported and reasonably top-down in their suggestions of 'appropriate' livelihoods (Wright *et al.*, 2015). This experience would suggest that fishers are enthusiastic about maintaining livelihood autonomy, and more careful matching between skills and economic opportunities may be more successful.

El Nido: diversification not substitution

El Nido demonstrates once again that initial success in obtaining high catches (and therefore sufficient income) is not a good indicator that a player will persist in fishing. Conversely, consistent low catches are not necessarily linked to shifting. This game had no resisters, as all players tried alternative livelihoods at least once. An odd feature of this game was the unusually high 'salaries' paid to fishers who shifted to tourism, set by NGO workers playing the role of resort owners and employers. Actual tourism representatives

did not respond to the invitation to attend, and the area's biggest resort sent representatives from their philanthropic foundation, rather than from its commercial arm (flagging another discussion about participation and engagement, which is presently out of scope). High salaries, however, did not stop the fishers from moonlighting in fishing, nor their return to solely fishing when the game master discovered their 'double-dipping', ostensibly against game rules. This would tend to support recently emerging evidence that in many cases alternative livelihoods will supplement fishing, rather than replace it (Slater *et al.*, 2013; Wright *et al.*, 2015). As with other games, all fishers regularly experienced less than subsistence incomes from fishing, which was not enough to encourage more than partial shifting in most players. Note here that the rule-breaking opened avenues of behaviour and discussion about juggling multiple jobs that would have not been possible in traditional experimental games. This outcome tends to suggest that livelihood diversification may have mixed impact on fishing effort (Salayo *et al.*, 2012), but has important outcomes for household wellbeing, such as extra income, food security and identity maintenance (Weeratunge *et al.*, 2014). Marine resource conservation, however, may be better served by redirecting resources to focusing on restocking of high value species and reducing destructive fishing (Cabral and Aliño, 2011).

Lubang/Looc: 'a better life for the children'

In Lubang Island, nine out of ten players stayed fishing the entire game. In addition, unlike any other fishers in all other sites, several players managed to stay above the income threshold the entire time. Many of the others only dipped below the threshold towards the final stages of the game, when the earnings of their household player would have defrayed their own losses. In addition, many players intermittently managed catch income many times the threshold level, making aggregate catch income substantially higher than in other games. Catches were tailing off towards the end of the game, and it is difficult to say what would have happened if as many rounds were played as in Batangas City (17 rather than 10), for example. The sole fisher to shift had not experienced below threshold income prior to trying alternative livelihoods, once again illustrating that economic necessity was not a driver of exiting the fishery in the game.

Catch levels largely reflect slightly different parameters embedded in the underlying model, rather than any greater skill/luck of the players. As Lubang Island fishers still enjoy relatively higher catches than other areas, partially due to the island's location in the South China Sea and the productive Verde Island Passage (Villanoy *et al.*, 2010), the model was

adjusted for this site to reflect this. Despite the almost total lack of shifting in main players, Lubang Island's household players ('children') were deployed outside fishing at rates comparable to other games (74%). This illustrates how risk shifting through diversifying is a key strategy, even when fishing income is relatively good. Concentrating on creating accessible livelihoods for younger fishers to prevent them entering the fishery may pay off in areas where overfishing has not yet resulted in catastrophic catch failure. Unlike other sites, Lubang Island's fishing dynamics did not represent a 'best-case' shifting scenario, because whilst alternative livelihoods were accessible and plentiful, fishing still offered higher or commensurate incomes. This indicates that plans to reduce fishing are perhaps overly ambitious in the absence of strong pulls – economic, social and cultural – into alternative livelihoods.

Mabini: older fishers have 'nowhere to go

Like Lubang/Looc, most players in Mabini were resisters. However, Mabini's fishers did not have high catches balancing out the lean days, as all players spent at least half the rounds below the threshold level. Partial shifters were also relatively token, with only brief initial forays into alternative livelihoods that were not repeated, possibly because of relatively low incomes. No players shifted entirely. However, household player participation in alternative livelihoods was the highest of any game (98%). Like Batangas City, Mabini is an area with high levels of tourism, industry and 'overseas Filipino workers', so alternative livelihoods that are at least nominally accessible to fishers are reasonably accessible and plentiful. Why then, were fishers reluctant to even experiment in shifting?

This, more than any other game, tended to illustrate the genuine and ongoing difficulties fishers face when looking for alternative livelihoods: wages are low and unemployment is high. When repeatedly encouraged by game facilitators and local government representatives to leave fishing, fishers protested that this would mean a 'big' sacrifice and that local industries are only interested in hiring younger people with higher education levels. Like Lubang, this points to the importance of focusing on younger fishers when devising exit programs, as even the game's virtual world of reduced barriers to employment and considerable social pressure to leave fishing was insufficient. Concurrently, it is further evidence that any program that uncritically attempts to encourage alternative livelihoods (Wright *et al.*, 2015) without attending to access to skill building and education is likely to fail.

Puerto Galera: seasonal shifts

Finally, and in contrast to both Mabini and Lubang, Puerto Galera had no 'resisters', possibly due it being the area with the most accessible and available alternative livelihoods of the field sites. In addition, the LGU in this game was very active in creating fisheries regulation, including a closed season, which excluded most of the fishery. About half the players completely shifted, and the rest experimented with alternative livelihoods – oscillating between fishing and not-fishing more than once. Like most other games, fishing was not able to provide a consistently sufficient income to meet family expenses for any fishers. The cyclical return to fishing is the strongest evidence from the games that fishers use alternative livelihood income to compensate for low fishing income, particularly during the monsoon, but still consider fishing to be seasonally important. Like in Batangas, fishers reflected positively on livelihoods that maintained their sense of autonomy, and, further, their connection to the ocean – principally through providing sea-based transport and tourism services.

Another point of differentiation for Puerto Galera was the proactive role the government took in supporting and encouraging fishers into alternative livelihoods. In contrast to Mabini, where government representatives simply lamented the fishers' lack of 'initiative', the Puerto Galerans imaginatively offered incentives such as health insurance and training to fishers considering exit. This increased uptake considerably, and helped the fishers to accept a closed season, which they had initially vigorously opposed. Whilst local governments in the Philippines are typically under-resourced, there is still scope for small, targeted projects to support transition into stable and appropriate alternatives.

Reflections on workshops, trust and dialogue.

The Puerto Galera example illustrates how these workshops can be useful for building trust and inter-sectoral relationships. Initial interactions between the government and fishers in this workshop were unusually hostile. However, as the workshop went on, the government representatives realized that they would need to use their soft skills of persuasion and dialogue rather than a 'command and control' strategy to successfully reduce fishing effort. The presence of fishery scientists to explain fish reproductive cycles also helped build understanding and acceptance. In other workshops, the presence of industry representatives opened conversations about the possibilities of mariculture, particularly of high value species for restocking dive sites; inter-LGU discussion revealed

an oversight in joint marine protected area planning that could have been devastating in a 'real world' scenario; and alerted scientists to the burgeoning problem of homemade fish-aggregating devices. All these small ad-hoc moments of shared experience are part of what face-to-face interactions make possible, and that the game facilitated and guided.

In this way, ReefGame becomes not only a research tool to explore exit from the fishery, but also a rehearsal space for different stakeholders to 'practice' their responses to a declining resource, in a way that openly negotiates between cultural, social, economic and environmental values.

One-off gaming workshops cannot single-handedly establish relationships of trust between different groups, such as fishers, scientists, government administrators and managers. Rather, I argue that these face-to-face interactions offer important opportunities for building relationships while simultaneously answering important research questions. Documenting and critically reflecting on the use of these dialogic methods, as I have attempted to do here, will help establish them as legitimate alternatives to traditional avenues of inquiry.

Limitations and further studies

This study had several limitations. First, and as mentioned, our recruitment strategy was outsourced to the local government, which limited our access to 'non-organised' or disengaged fishers, which inevitably influenced our participants. In particular, women fishers were almost entirely excluded (Kleiber *et al.*, 2015), and the economic and social background of participants is unknown. More inclusive recruitment and incorporating demographic characteristics into game analysis may result in further insights.

Retrospectively, it would have been helpful to control some variables a little more, including number of rounds and the varying income thresholds for each player. Indeed, many other games played were excluded from this analysis as they were simply too different to compare – played over shorter time periods, with different framing activities and with non-fishers role-playing as fishers. As discussed above, the design of the game was deliberately responsive and therefore highly variable: this necessarily excludes some avenues for comparison and analysis, while opening others.

Finally, the design of the game made it difficult to interrogate the important impacts of economic stratification and social class in willingness to exit (Knudsen, 2016). One option would be to have fishers playing themselves, rather than having fisher profiles with pre-determined assets and family sizes. Another would be to have players starting from a

more exaggerated 'unlevel' playing field, with some starting with considerable financial assets as well as better equipment. This would make it possible to observe and discuss emerging differences in strategies, without running the risk of players' behaviour being overly determined by game mechanics.

Conclusion

Compared to traditional experimental methods, quasi-experimental field games do not offer a controlled environment to examine a few select influences on natural resource management. The context-rich environment enables insights that are less accessible through other methods. At the same time, it excludes true quantitative comparison between case studies, and any claims to representativeness. However, the social benefits of bringing stakeholders together in a setting that does not principally revolve around either pressured 'participatory' decision-making (Durand *et al.*, 2014), data extraction, or information transfer more than compensates for the diminished quantitative data. Providing context allows participants to point to the contextual features that are shaping their decisions, instead of hypothetically reading these influences back in after your results are obtained and analysed.

Indeed, the games revealed some useful patterns that can be incorporated into future projects that aim to reduce fishing effort through a focus on alternative livelihoods in developing countries. First, the existence of suitable employment options is a necessary but insufficient prerequisite, where suitable means attractive, viable and accessible to fishers who may have limited education and strong attachments to the autonomy and relationships to the ocean offered by fishing. Secondly, focusing on the younger generation, through facilitating access to education and to employment, is likely to be more effective than any blanket approaches. The rule-bending that occurred in the El Nido game, as well as the intermittent shifting strategy exhibited by many players, also provides strong support that livelihoods outside fishing are widely considered to be supplementary more than replacement livelihoods. Therefore, any genuine attempts to restore marine resources will need to look beyond reducing fishing effort towards stock enhancement and community-endorsed management strategies such as closed seasons and marine protected areas. Overall, games such as ReefGame offer a complementary approach to both traditional surveys and traditional workshop formats for stakeholders to work together for a more sustainable fishing industry.

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4. Rehearsing inclusion

Knowledge culture	Sources of evidence	Sources of dismissal
Organisational 	Networks Progress towards goals Cost/benefit analysis ("this type of evaluation is sorely needed.")	Deals Mates Corruption ("represent[s] prescriptive ideas shared by a conglomerate of the most powerful actors")

Adapted from Brown (2004; 2010a; 2010b); comments from peer review in brackets.

Overview

Taking up the threads of the importance of face-to-face interactions as a critical aspect of successful conservation for development introduced in the previous chapter *Playful shift*, this paper *Rehearsing inclusion* takes a critical look at the ubiquitous practice of stakeholder workshops. It is in press following a 'revise and resubmit' for the journal *Conservation and Society*. *Rehearsing inclusion* takes the FindFishSup project as a case study of multi-stakeholder engagement and applies Iris Marion Young's theory of communicative democracy (Young, 2002) to analyse the interpersonal interactions the project engendered.

This is an abductive approach. By "taking a known phenomenon" (workshops) and "recontextualising [them] by using existing general theories" (Young's framework) (Losoncz, 2017), I endeavoured to reinterpret workshops as events of democratic potential. I had turned to Young for her theoretical strength in seeing possibilities where ideals were not being met. It is very easy to dismiss one-off workshops: they follow the tendencies of the externally designed and funded projects they spring from in reproducing symbolic, material and representative inequities. However, in this work I wanted to see if Young (2002) offered opportunities for redemption, if in this practise of 'participation' we could find moments of resistance and reshaping. I believe it does: it is these hopeful fragments that the paper seeks to identify.

This paper is perhaps the least clearly related to the knowledge cultures, although it was aiming for a pragmatic and strategic pros/cons evaluation of how top-down conservation practices could be harnessed for inclusive democratic ends *a la* organisational thinking. Any support of workshop practices (however qualified/contingent) could indeed be dismissed as dealing in networks of corrupt exclusion (Brown, 2010b), as they so clearly only acknowledge an 'in' group of invitees. This element is indicated by a reviewer emphasising the need to incorporate more

recognition of the "prescriptive [neoliberal] ideas shared by a conglomerate of the most powerful actors" and "external exclusion" (i.e. who was not invited to the workshops). This problem is shared by the hope framework more generally. When we look for 'positives' through academic writing, we expand their hopeful strength and significance, developing a coherent argument for a constructive path forward. In the process we must always ask if we are providing justification for the continuation of manifestly unjust practices, and as a consequence, diluting energy and impetus for more radical structural change.

I think not. Critique is certainly not dead, one only has to search academic databases for "neoliberal conservation" to unearth a plethora of examples focussing on what McKinnon (2008) has referred to as "perfect hegemonies". This literature is useful in uncovering the ways oppressive practices are made and remade through ostensibly participatory projects (see, for example, Büscher *et al.*, 2012). However, always at the moment of having to create and submit coherent works of text, the hopeful possibilities narrative won out for me: this is not the only way, but it is the way of this thesis. It seems I can only tell failure somatically, as with my dance-based final presentation, or obliquely, as I attempted to do in the final paper *Fishing for a career*. This is not just a personal blockage: the academic institution has deep, reinforcing drivers for scholars to narrate at least the *possibility* of success – even if only successful critique (Halberstam, 2011). In *Rehearsing inclusion,* then, I have tried to take the cost/benefit analysis approach of the organisation knowledge lens – one that can acknowledge structural oppressions, but still allows room for other ways of being.

Paper - Rehearsing inclusive participatory democracy through fishery stakeholder workshops in the Philippines

In press in *Conservation and Society*

Abstract

Participatory methods in 'conservation for development' projects regularly fail to live up to expectations of social and environmental change. Stakeholder workshops are an ubiquitous example that can reproduce rather than challenge inequality and exclusion. Technical tools used in workshops, like maps, games and computer models, are criticised for unjustly privileging expert/scientific viewpoints over other perspectives. Iris Marion Young's theory of communicative democracy is an insightful and robust framework to examine how people interact in the workshop 'contact zone', and how to bring workshops closer to participatory ideals. Young identifies four communication modes critical for inclusive participation: greeting, rhetoric, narrative and argument. We apply her framework to a case study of fisheries stakeholder workshops in the Philippines, demonstrating its utility and cultural applicability. The workshops used a game-based computer modelling tool to structure discussions about coastal management. Qualitative analysis of video data shows how stakeholders signalled resistance, garnered sympathy, influenced outcomes and established relationships through Young's modes of communication. Based on this analysis, and using concepts from Philippine psychology, we conclude that workshops have potential as 'rehearsal spaces' for inclusive deliberation, particularly when they encourage improvisation and humour, rather than rote adherence to standardised activities.

Keywords: games, conservation for development, alternative livelihoods, community-based coastal resource management, participatory modelling

Introduction

In 2010, I (the first author) was on an island in the Philippines, in a room decorated with posters brandishing marine conservation messages. A senior ecologist was presenting to about 30 people in 'Taglish', typical among educated Filipinos. His slides showed a line graph with a downward sloping regression line. For those familiar with interpreting such images, the meaning was clear: with fish biodiversity and coral cover plummeting, the local reefs were in a poor state – and declining.

Most attendees were fishers, with only primary school education, and likely did not have these skills. None exhibited signs of impatience recognisable to me, the sole Western observer, but nor did they show comprehension. When the ecologist finished, he returned to us, the assistants and apprentices. “See”, he said, “it is very important to give their information back to them. You must not just do your surveys and leave”. I admire his sentiment, effort and execution – perhaps it is not so important if some things are lost in translation.

In our two days of workshopping with the fishers, our communications tools also included a game, computer models, maps and paper-based activities, all including the message that there are no longer many fish in the sea. The game had been particularly promising in its persuasive capacity – I recall how a senior manager from one of the international development banks (IDBs) excitedly summarised its potential, saying “I see what will happen. They will play the game. Their fish catches will drop. They will realise they can earn more money working in other areas and they will leave the fishery. Then the ocean will recover and everyone will be better off.” This was, of course, exactly what we had planned, albeit not so explicitly. One fisher asked: “you want us to stop fishing, don’t you? Why don’t you just come out and say it?”. It’s a question the second author has also asked, concerned about how honest our dealings with the fishers were.

However, workshops are never just ‘message sent, message received’. At the end of each, we asked fishers what they had learnt and what could help their depleted fisheries. One participant said fishers should be given assistance to buy more efficient fishing gear. Another said to remove access restrictions due to shipping lanes, so the fishers could harvest a larger area. Still another said we had taught them how to catch more fish. Finally, one used our invitation to imagine alternative livelihoods as an opportunity for comedy, suggesting “a beer house with girls”, to great mirth from all in earshot.

***

In this vignette, disappointment and cynicism coexist with appreciation of how 'stakeholders' upended our clumsy, yet typical, outreach. It also captures the ways in which the power relations between researchers, government and those we wish to persuade and regulate are ambivalent and reconstituted in every (interpersonal) encounter. Through our case study of fishery stakeholder workshops in the Philippines, this paper explores this clash between attempted persuasion and resistance, and demonstrates how workshops

present opportunities for both challenging and entrenching inequities, injustice and narratives about the causes and solutions to environmental degradation.

Although workshops are often overlooked as a principal site of inquiry (Park, 2014), they are pervasive features of conservation for development projects (Green, 2003). Workshops are usually organised by metropole actors, such as research institutions or non-government organisations (NGOs), who invite a limited range of satellite and metropole actors to participate in face to face activities and discussion around a particular topic. Critics of participation have identified how workshops can entrench conflict (von Essen and Hansen, 2015), structurally exclude particular social groups from effectively participating (Durand *et al.*, 2014), and promote false consensus and silence marginalised voices (Kothari, 2005).

Workshops often use scientific tools to help frame discussions and 'educate' participants, including models, maps and presentations. Such tools can embody the more general criticism levelled at conservation for development projects: they favour a technical, scientific interpretation of environmental problems, crowding out alternative explanations, and reinforcing power inequalities. In this way, tools provide a voice for science and rationality, a voice that is difficult to argue with or challenge (Hoofd, 2007). Indeed, critics of so-called 'neoliberal conservation'[13] tend to view the technical discourse encompassed in such tools as legitimising enclosing or privatising common resources and excluding local people from their livelihoods and subsistence activities, while hiding the powerful players that sanction these solutions (as in the IDB employee of the opening vignette) (Büscher *et al.*, 2012; Cooke and Kothari, 2001).

These critiques pay little attention to the continuing power that resources users have over their commons, and tend to downplay any capacity for meaningful participation within hierarchies. This can lead to paralysis: where presumably the ideals of democratic inclusion are still valued, but there is no way of creating a useful encounter between dominant and marginalised groups. At the same time, 'conservation for development' projects, and the workshops they engender, continue apace. Scientists, conservation workers and government officials, like local dwellers, have legitimate responsibilities for, and knowledge about, natural resources. As we believe that "inclusionary conservation

13 We agree with Braithwaite (2008), who argues that 'neoliberalism' is a misnomer, preferring 'regulatory capitalism' to describe the burgeoning avenues/agencies for regulation, which are sometimes, but not always, conducive to private interests. 'Neoliberal conservation' has, however, emerged as an umbrella term to refer to activities perceived as such (Büscher et al., 2012).

represents the politically most feasible and socially most just form of conservation possible" (Nygren, 2004: 189), and that face-to-face encounters are critical for inclusion (Agarwal, 2001), then we must find an analytic lens that offers conceptual and practical tools for both understanding what happens in hierarchical encounters, and how to make them more inclusive.

Mary Louise Pratt's (1991) concept of a 'contact zone' offers such a lens to understand the role and potential of workshops, without the intractability of participation critiques discussed above or erasing the power relationships and the impact of heterogeneity among 'stakeholders'. Contact zones are "social spaces where cultures meet, clash, and grapple with each other, often in contexts of highly asymmetrical relations of power" (Pratt 1991, p33). By emphasising interactions (meeting of cultures) and conflict (clash/grapple), contact zones offer a way of interpreting 'what happens' in workshops as both a performance, and a possible reordering, of power and control. This means even when workshops are not explicitly for policy or decision-making, they are an important part of democratic processes, through offering (uneven) opportunities for deliberation and engagement inside a 'contact zone' (Parkins and Mitchell, 2005).

By understanding workshops as 'contact zones', we can analyse them as incompletely inclusive spaces for practising participatory communication. In this view, workshops are not simply benign or coercive, but they do play important roles in negotiating how to perform participation, and in defining problems and acceptable solutions (Park, 2014).

Pratt's 'contact zones' characterizes participatory workshops as spaces of potential disruption, but the concept offers little more in the way of understanding the specific norms of communication that maintain hierarchical interactions, or how dominant discourses can be upset by marginalized players. As indicated by the introductory vignette, and predicted by the critiques outlined above, in our workshops, attended by a range of fisheries stakeholders, most activities reflected the voices of a group of government representatives and scientists, rather than fishers. These dominant views on plausible and preferred solutions, in this case for depleted subsistence fisheries, remained largely unchallenged, at least superficially. Iris Marion Young (2002) argues this is 'internal exclusion' – where simply being present is not enough to ensure meaningful participation. She further suggests that this exclusion is at least partially a function of how 'argument' – rational, dispassionate persuasion – is unjustly privileged in deliberative processes.

Young argues that inclusive communication must pay attention to three further modes of communication: greeting, rhetoric and narrative (see Table 1). With this, Young displaces rational argument (including positivist science), and emphasises the complementary importance of symbolic (greeting), emotional (rhetoric) and story-based (narrative) communication (Young, 2002). Through accepting, encouraging, and listening to these other modes we can answer Pratt's call for "ground rules for communication across lines of difference and hierarchy" (Pratt, 1991: 6). The ground rules begin with greeting: acknowledging the shared humanity of those sharing a contact zone, in both ceremonial and ongoing ways. Argument, "articulate, dispassionate and orderly" (Young, 2002: 6-7) communication helps persuade and inform, but tends to be the voice of the powerful, as mentioned. Narrative, in contrast, uses retelling personal or collective experiences to illustrate alternative perspectives and establish common ground. Finally, rhetoric includes the emotional, aesthetic and symbolic means of communication that accompanies all interactions.

Table 1: Identifying Young's (2002) communication modes

Communication mode (all quotes from Young 2002, page numbers in brackets)	Rhetorical characteristics	What we looked for in the data	Filipino resonance
Greeting "Greeting, or... public acknowledgement, is ...where a subject directly recognizes the subjectivity of others" (53)	- Universal/ consensual language - Appeals to sameness (not difference) - Formality in one-to-many addresses and ceremonial interactions and informality in ad-hoc one-to-one interactions	- Explicit acknowledgement of each other in speech and body language - Who spoke to whom? - 2nd person statements (absence indicated by 3rd person statements)	Kumustahan (greeting) A central aspect of Filipino etiquette, and associated with ethical and civil engagement with research subjects (Enriquez, 1990; Fernandez, 2002). Pakikitungo is a polite, transactional interaction you have with outsiders, as classified in Filipino research methods (Santiago and Enriquez 1976 in Pe-Pua, 2006)
Narrative - Demonstrate, describe and justify a point of view - "Reveal...values, priorities and cultural meanings" (75) - "Relate a sense of wrong" (72)	- First person statements - Vision/ imagination/ metaphor/ analogy - Character - Normative claims	- Descriptions of life histories - Justifications for decisions made - Details of customs, habits or experiences	Pakikipagkwentuhan Aside from lay meanings, this is a key Filipino research method, referring to a gentle, reciprocal exchange of stories. (Pe-Pua, 2006; Enriquez, 1990) Kasaysayan is also a Filipino method, meaning extracting the meaning, sense, or relevance of happenings for a particular group (Mendoza, 2007)
Argument "The making of assertions and proposals and providing reasons for them that they claim ought to be acceptable to others..." (p56)	- Articulate - Dispassionate - Orderly - Persuasive	- Assertions - Proposals - Logic and reasoning - Causal connections	Pangangatwiran logical, scientific and rational argument, commonly used in academic Filipino (Barrios, 2012)
Rhetoric "Rhetoric refers to the way claims and reasons are stated... include(d) in this category (are) the affective dimensions of communication" (p7)	N/A	- Jokes, sarcasm, irony - Body language - Emotions	Sayusay The way things are said, used in Filipino linguistics and literature studies (Atienza, 2014)

Young's framework, known as her theory of communicative democracy, helps us provide a critical voice, that nevertheless offers hope for imperfect improvement,

complementing Pratt's call to make contact zones the "best site of learning [they] can be" (Pratt, 1991: 6). It is a tool for deconstructing what 'happens' in workshops, by examining interactions at a micro-scale and looking for evidence of these alternative modes of communications to "pluralize (and) relativize hegemonic discourse" (Young, 2002: 7), while orientating us to look for how to better meet the ideals of inclusive communication. Where other authors have used and expanded on Young's insights for understanding exclusion (Durand *et al.*, 2014; Parkins and Mitchell, 2005; Peterson, 2011), our focus is on how we can activate her framework to search for and expand moments of inclusion. We want to acknowledge injustices, but also look for openings to rectify these, through what Young calls "possibilities glimmering" (2002: 10).

This orientation towards the ever-present potential of reconfiguring hierarchies through engagement and dialogue, is strengthened through insights from Philippine psychology (*Sikolohiyang Pilipino*). Philippine psychology is a branch of "passionate and emotive" Indigenous studies unique to the Philippines (Mendoza, 2007: 4), a particularly appropriate source to deepen understanding of participatory projects held in that country. Maggay (2001) argues Filipinos have relational understandings of power and obligation, contested and created through each interaction, making workshop contact zones important sites of potential reconfiguration. Critically for our case study, Young's Western communication categories find cognates in Filipino language and social theory, and in Filipino's preferred communication modes (insofar as these can be generalized, see Table 1). Maggay (2001: 112-13) writes "[Filipinos] prefer concrete imagery, …poetic utterances, rhetorical improvisations" over "abstraction, impersonality…and technical precision". In turn, Filipino concepts of shared responsibility to humanity (particularly to those you know personally), the relational power of story exchange, and the central importance of the emotional content of speech enrich Young's categories, and expose the tenuous hold that rational argument has in controlling a discourse, even where power disparities are marked.

This paper applies Young's framework, grounded in Filipino understandings, to a series of workshop in the Philippines, using it to: 1) interrogate how participants interacted; and 2) distil lessons for improving workshops. First, we outline the Philippines case study. Following, data collection and analysis are described, with further justification for applying Young's ideas in the post-colonial context of the Philippines. Then we apply each element of Young's framework to observed workshop interactions, teasing out the

implications for inclusive participation. We conclude by offering some suggestions about what our findings imply for both critical analysis and workshop design.

Case study

Our case study is an ecosystem-based management (EBM) tool demonstration project funded by a US-based foundation, but implemented largely by Filipino scientists and facilitators. EBM is a 'scientific' approach that nevertheless has a focus on integrating social and conservation values into environmental decision-making. Funds were granted to demonstrate tools and thus hopefully improve uptake of the freely available EBM tools on the internet. Our project demonstrated ReefGame, a computer-assisted board game. The game encourages fishery stakeholders to explore alternative livelihoods and marine conservation options, through scenario-based game rounds. It is supported by an underlying computer model that calculates catches, income and environmental change (for more details, see Cleland, 2017b).

In the Philippines, local government units (LGUs) manage marine resources out to 15km, which encompasses the fishing grounds of the approximately one million small-scale fishers. Most of these fisheries are considered overfished (Muallil *et al.*, 2011). Since the 1970s, many thousands of small-scale 'community' marine protected areas (MPAs) have been declared in response to declining catches and reef health. However, their overall effect on catches has been negligible, attributed to size, enforcement problems and overall fishing pressure (Arceo *et al.*, 2013). LGUs, often working with NGOs, continue to implement 'coastal management', often in the form of MPAs, and/or environmental education, alongside alternative livelihood projects. Despite these interventions, overfishing, ecosystem degradation and poverty in small-scale fisheries continues to climb, along with the number of fishers (Teh *et al.*, 2013).

These characteristics hold true for the EBM project's six sites in the Philippines, where two-day workshops were held in 2009-10 (see Figure 1, and for more site-specific details see Cleland, 2017b). Whilst the sites were chosen for having a range of socio-economic characteristics and differing access to livelihoods for local fishers, analysis showed far more intra-workshop than inter-workshop variation in interaction patterns, and this is the focus here.

Figure 1 Workshop locations (image credit: Clive Hilliker)

At the workshops, between running ReefGame over four mini-sessions, facilitators spoke about the status of local fisheries and ran other group activities. Participants included local fishers, LGU and provincial environmental officers, volunteer coast guards, industry representatives (e.g. tourism/aquaculture), and environmental NGO workers. Project staff invited the LGU, who invited all other participants. The impact of this is explored further below. Each workshop had ~30-40 participants, comprising about 50% fishers, and around five people from each other group. They were 'participatory' in the sense that attendees played the game, rather than simply hearing a lecture on what it was and how to use it, but the format and running of the workshops was not open for negotiation.

Methodology

Data collection and sampling

Four of the six workshops were videotaped, while the rest were observed with detailed note-taking. The first author ran the ReefGame computer model during sessions, as the game co-designer. In addition, she has participated in approximately 20 workshops held for other, similar projects. This provided additional context for 'how' these events typically take place in the Philippines, without forming part of the substantive data.

The amount of data, including ~200 hours of video, necessitated a pragmatic yet meaningful analysis strategy. We chose what to analyse in three ways: by activity, nodal

moments and unusual voices, explained in turn below. The second author then selectively transcribed/translated the videos in Transana (video analysis software), following these criteria.

Firstly, we concentrated on ReefGame and debriefing sessions. The game provided the most unstructured and lengthy opportunities for participant interaction. Most other activities had just one person talking (e.g. presentations) or broke participants up into their interest groups (fisher, NGO worker, etc.). Further, the game was presented across four sessions, showing how group dynamics developed over the two days, and offered clear potential for observing all Young's communication modes. Through offering a playful space, we had hoped to at least partially disrupt the one-way information flow characteristic of many workshops.

Secondly, eight project staff nominated 'nodal moments' (Henry, 2012) of heightened emotion, tension or conflict, for each workshop. Guided by this, we identified instances where participants expressed opinions that were either explicitly or implicitly in conflict (per Pratt 1991), including when facilitators felt uncomfortable or disappointed with participant interactions. This follows recent ethnographic work highlighting the importance of dissonance in researchers to identify cultural and social structures underpinning social behaviour (Trigger *et al.*, 2012).

Finally, with respect to unusual voices, we examined instances where fishers' voices were dominant in conversations. These mark an exception to the usual balance in these workshops, and all others observed, as the voices of facilitators and government representatives tend to dominate, and fishers become "passive participants" (Agarwal, 2001: 1628).

This data analysis process generated approximately 50 'scenes', which were further analysed in depth for evidence of Young's modes – greeting, rhetoric, narrative and argument.

Analysis

Instead of coding, we used detailed transcription notation, analytic memos and vignette writing to link the action and dialogue of the scenes to each concept (Saldaña, 2015). Table 1 explains each mode, and how they were identified. As rhetoric always accompanies the other modes (being style not content), it appears as a column as well as a row. The final column details how Young's modes map onto Filipino concepts.

Scope/limitations

We examine only the interactions that took place inside the workshops, guided by a sequential focus on each of Young's communication modes. This results in a certain loss of context, as we concentrated on similarities/differences across workshops rather than specific characteristics of each site, and how that impacted results.

Further, as discussed extensively by Young herself and others (Agarwal, 2001; Peterson, 2011), external exclusion is a significant ongoing issue in participatory forums for conservation across the globe, and our project was no exception. Women fishers were almost entirely excluded. Similarly, despite direct instructions to the contrary, LGUs mostly invited fishers they had previous interactions with. The role of workshops in preserving episodic relationships formed through 'events' such as workshops is discussed further under 'Greeting'. Prior contact may have made fishers more likely to speak up, although, as introduced, this was not universal. Indeed, as we shall see, resistance was overall as common as capitulation and commitment to the authoritative voices of scientists and government representatives. No less significantly, while industry members were invited (e.g. tourism/shipping), they tended to send representatives from their philanthropic arms, rather than those more likely to play roles in managing industrial impacts on the fishery (e.g. through pollution, employment, and access restrictions). These exclusions are not exceptional, rather they point to the continuing need for active attention to whose voices even have a chance to be heard, or who is considered the site of the problem. They are, however, not the focus here.

Results & Discussion

We now examine each of Young's modes – greeting, argument, narrative and rhetoric –in turn, paying attention to how and when they were deployed in the workshops.

Greeting

If nothing else, workshops offer extended face-to-face time, with numerous opportunities for explicitly recognising "the subjectivity of others" (Young, 2002: 53). We give examples, then consider where greeting did not meet expectations. Finally, we integrate Young's conception of greeting with the Filipino cultural concept of *pakikipagkapwa* (shared humanity) (Enriquez, 1990), and identify workshops as opportunities for cultivating this sensibility.

Face-to-face acknowledgement

Workshops provide many formal and informal moments for mutual acknowledgement. From the beginning, following Filipino custom, our workshops dedicated a good hour to *kumustahan* (greeting). Participants arrived and registered, while being greeted individually by project staff. Staff then conducted a general welcome, and each participant stood up and introduced themselves. Group activities then give multiple chances to solidify existing relationships and create new ones. In particular, the centrality of sharing food to bonding and community-making in Filipino culture and the requirement to have five meals/day multiplies the times in which people must encounter each other one-on-one – by waiting in line, sitting beside each other, making small talk and having eye contact.

Closing ceremonies offer a final formal opportunity for mutual acknowledgment. In the Philippines, each person is called to the front to receive a handshake and an attendance certificate. The certificate acts as both material gesture of appreciation for people's time and a symbolic reminder of the status conferred by being an invited participant to a formal, catered event. As the final interaction, closing ceremonies form part of the preparatory ground for future interactions and mutual commitments, extending the workshop's potential impact beyond its temporal existence.

Failures of greeting

Critics accuse Young of "placing unreasonably high expectations" on what greeting can achieve (Melton, 2009: 177). Young herself (2002) points to how ceremonial interactions can be insincere, superficial and pro forma, and how inclusion and recognition are often not maintained throughout face-to-face interactions and beyond. Recognising where acknowledgment does not occur helps avoid overstating its role and power.

One signifier of 'greeting failure' is where subordinate groups are referred to in the third person (Young, 2002). Conservation for development projects consistently establish fishers as the target of interventions: they are identified as 'the problem' in need of 'fixing', in a conversation not necessarily involving them (Peterson, 2011). LGU representatives often remarked on fishers' behaviour to each other and facilitators, rather than to the fishers themselves. For example, an LGU worker, mid-game: "From what I see, they will keep fishing until they die." Similarly, in debriefs, LGU participants tended to emphasise

how the game educated the fishers ("they learned"), rather than recognising any learning for themselves.

Further, as already introduced, workshops had marked asymmetry in interactions, in terms of who was empowered to direct comments and questions to whom, and whether those comments were responded to. When addressed as a group, fishers received judgments (about their lack of skill as fishers, or their stubbornness in continuing fishing) and rhetorical questions (for example, what were they going to do about the worsening environmental status), to which answers were often not expected nor forthcoming. Fishers initiated interactions far less, usually to ask procedural questions like "are we playing another round?". However, when facilitators addressed fishers one-on-one, using their names, a more equal verbal exchange would take place. This observation underscores the importance of individual-specific acknowledgement and greeting, rather than vague, group-level interactions, in establishing trust and dialogue between unequal groups.

Pakikipagkapwa: vulnerability, obligation and a shared humanity

A final aspect of Young's conception of greeting that resonates particularly strongly in the Philippines context, is that of the "unavoidable claim" on the other (Young, 2002). Recognising shared humanity in face to face interaction is cognate to a key concept in Philippine psychology *pakikipagkapwa* or 'shared identity' (Pe-Pua, 2006), and has two sides: vulnerability and obligation. The calling upon of an interpersonal relationship, especially between one who has (*meron*) and one who lacks (*kulang*), creates a moral claim of responsibility for the wellbeing of the disadvantaged other (Ransan-Cooper, 2015). In this way, workshop invitations, here handled by LGUs, can act as recognition for past support as well as a promissory note for future benefits, should other projects choose the locale for their activities. In this way relationships are both created and preserved through invitations to, and participation in, workshops.

Fishers and LGU representatives explicitly referred to the potential conferred material and monetary advantages of creating relationships with externally sponsored project staff. Comments about the possibility of securing jobs and resources from 'foundations' and 'NGOs' were common. Fishers signalled allegiance by wearing branded clothing from international environmental NGOs – a kind of unspoken greeting about anticipated shared values, and evidence of (minor) material benefits of having been involved in past projects. These fishers' overall (but not universal) greater enthusiasm for conservation lead us to dub them the 'converted fishers', discussed further below.

The flip side of greeting as shared recognition of humanity is the vulnerability inherent in bringing your body into a shared space. Here, one may compensate for vulnerability by deliberately adopting the values of a more powerful group. Fernandez (Anonymous) points to the violence of Philippine's thrice-colonised past as a key to the Filipino's trademark hospitality and friendliness, spoken of in the Philippine psychology literature as *pakikisama* ("getting along" (Maggay, 2001: 114)). Here, greeting risks merely being an opportunity for a weaker party to signal 'I'm not a threat' instead of genuinely establishing a contact zone where different communication modes, as well as different values, are welcomed and respected. Overall, the deference shown to facilitators and government representatives tends to suggest that the former was likely occurring in the workshops, at least sometimes.

However, the workshops did offer repeated moments for both fishers and their advocates to remind those taking decisions affecting fishers to consult them directly. One facilitator continuously emphasised obtaining the fishers' permission for planned fishing restrictions during the game. Sometimes her requests were ignored, other times half-hearted acquiescence or silence from the fishers was enough for government officials to proceed. Nevertheless, this is the first example of workshops as rehearsal spaces for practising interactions: each moment like this is an opportunity for fishers' agency to be recognised and power relationships to be reconfigured.

In this way, fishers and other participants alike are reminded that first comes greeting – saying to one another 'I am here' and 'I see you' (Young, 2002), and then comes negotiation and dialogue. But without this first step, progress is unlikely. Failures of greeting in the workshop point to further work being needed to encourage and expand opportunities for one-on-one acknowledgement and moments of shared humanity, aside from any specific planned activities.

Argument

The central arguments of the workshop were the propositions that a) small-scale fisheries are key to the poverty/conservation problem and b) alternative (non-fishing) livelihoods and MPAs will lead to improved biodiversity and increased economic prosperity, both in and outside the fishery – the win-win argument. This "orderly, dispassionate and articulate" (Young, 2002: 7) argument was upheld by the more powerful players – project staff, government and NGO representatives – as well as the framing and motivation of both the game itself and other workshop activities. The win-win argument

is underpinned by a global, conservation science discourse, reinforcing its largely unquestioned dominance. A minority of fishers also agreed, but tended to violate argument norms and so remained marginalised. Overall, however, fishers were largely indifferent to the win-win argument, so it is questionable how much impact it has outside the contact zone.

The win-win argument: who and what

Project staff supported the win-win argument in several ways. Staff presentations outside game sessions emphasised overfishing and introduced policy ideas about reducing fishing pressure. In 'expert talks' during the game project scientists would explain how players had caused reef degradation through overfishing. Further, the lapel microphones given to facilitators to assist recording conversations reinforced the overall dominance of these voices. Although unintended, facilitators often drowned out the fishers' muttered side conversations, which were generally not overly supportive or encouraging of either MPAs or other means of reducing fishing pressure. How these side conversations act to refute the win-win argument will be taken up further below.

The exclusionary power of argument does not only rest in *who* can skilfully argue, but also in who shapes the terms of the arguments being made. In this way, the game seamlessly set up and privileged the win-win argument, as it made alternative livelihoods an easy and attractive option for players, while presenting as a neutral 'scientific' tool. The game, then, plays the role of an anonymous, one-sided argument, whose authority was not bodily present to question or challenge. This is perhaps of particular significance in the Philippines, where all things 'science' are explicitly linked in public discourse with ideas of modernity, progress and responsible citizenry (Anderson, 2007).

NGO and LGU participants also made the win-win argument at regular intervals, and the content was largely the same across all workshops. A typical example is the following:

NGO: "But the catch will improve because there'll be many coast guards (guarding the MPA)...Our reefs will improve"

LGU: "Destruction will decrease, tourism will increase."

These claims verbalise the logic behind conservation for development projects: win-win for both marine conservation and human wellbeing, ignoring that these expectations are frequently not met and benefits are often inequitably distributed (Chaigneau and Brown, 2016). Across sites the MPA-centred conservation discourse was very similar, despite aforementioned differences in socio-economic contexts. As argued by Gray and

colleagues (2014), MPAs have become the 'primary tool' of global conservation actors to pursue marine conservation. As established in the introduction, the Philippines has played a long and central role in gathering 'evidence' for MPAs, largely through 'community-based natural resource management' projects that have established small-scale MPAs throughout the country (Muallil *et al.*, 2011). Apparently exemplary outcomes for fisheries and conservation, like those reported on Apo Island, become part of the global logic supporting MPAs (Arceo *et al.*, 2013). These arguments are reiterated across scales, from global conferences to these local workshops. What is taken up and repeated by local intermediaries, such as the NGO and LGU representatives here, then carries the weight not only of local elites, but also of a global network of conservation authorities.

This does not, however, make MPAs 'merely' a tool to exclude small-scale fishers in a process of privatising the commons, although that also occurs (Cabral and Aliño, 2011). Rather, as Grey et al (2014) argue, the MPA discourse is continually negotiated and adapted to fit local realities. We now turn to how fishers adopted, adapted and resisted the win-win argument.

Disorderly, inarticulate, passionate arguments?

Some of the fishers vocally supported MPAs. These tended to be the 'converted' fishers, who were flagged earlier as wearing conservation branding. However, they did tend to violate argument norms, and were not often supported by other participants. Each workshop had 2-3 fishers that fit this description. These participants would mix calls to establish sanctuaries with a range of different issues, for example, urging "organizing" to form collectives to petition the government about conservation. These demands were accompanied by passionate exclaiming about the moral worth and importance of such measures, but certain confusion about who would be responsible, or how it would come about. In general, these commentaries received similar reception to those of the 'articulate and orderly' arguments discussed above: silence and dismissal by most.

When people do not follow the norm of articulateness, internal exclusion often follows. For example, a fisher gave a long speech involving various assertions, including that a particular ethnic group killed all the coral, and a long description of how he had learned that coral could be replanted. When transcribing, the second author wrote: *Sorry to say this, but [the fisher] goes on at great length, but in a very circular manner,* expressing our joint frustration in trying to follow the 'sense' of what was being said. When someone's meaning is not easily accessed by those facilitating, recording and reporting, their

perspective is lost. As it happened, a facilitator responded by explaining artificial reef restoration, and then the workshop broke for lunch. Awareness of argument norms, and patience with their violation, may have resulted in greater mutual understanding at this moment. Overall, however, these examples demonstrate how attempting to argue, without being orderly, articulate and dispassionate, tends to result in internal exclusion of marginalised participants in workshops.

But was it convincing?

Argument, as the rational, logical stance of experts, does not hold universal weight. Indeed, non-experts (everyone else) tend to dismiss argument as irrelevant to their particular contexts and situations (Brown, 2004). Further, whilst an unwillingness or inability to 'argue' may mean not influencing discussions inside a contact zone, it may have limited material impact outside that space. If fishers encroach on MPAs and ignore encouragement to leave fishing in 'real life', then they cannot be easily or efficiently controlled by officials – their numbers are too great and their activities too dispersed (Fabinyi, 2012). Their indifference to the win-win argument is critical.

In all workshops fishers did resist the top-down MPA argument, sometimes actively, sometimes passively. In four of the six workshops, most fishers were silent on the LGU representatives' unilateral implementation of no-take zones, even as facilitators asked them repeatedly to voice either support or dissent. As noted by Jackson (2012a), silence can be used strategically, to mark an unwillingness to participate, or a refusal to join in on the grounds offered. Participants' refusal to voice an opinion should therefore not be taken as capitulation, but rather as a marker of resistance.

In the other workshops resistance played out more actively. In one, the idea of an effective MPA was laughed at, with participants claiming nepotism, corruption and bribery would negate all conservation efforts. In another, fishers took the temporary absence of their LGU representative as an opportunity to wrest control, raising (play) money amongst themselves to pay for buoys to mark an MPA where they would have exclusive access to the boundaries reportedly rich in fish. This latter example demonstrates that it may not be the idea of a protected area that is resisted, but rather *who* gets to decide, on what grounds.

Further, the workshop 'learnings' referred to in the opening vignette (access to better gear, the need to harvest a larger area, and 'how to catch more fish') refuted the LGU/scientist arguments for restricting access to the fishery. Instead, they were calls to

the government and other better-resourced participants to support the fishers' right to their livelihood.

And, so, the persuasive powers of rational argument did not play out even within the workshop contact zone. As Green (2009) argues, people participate in workshops as a performance of citizenship, and as a marker of their right to access resources, but tend to refuse to take on responsibility they believe lies elsewhere. This strategic deflection of blame and responsibility is taken up further below.

Overall, then, arguments were relatively one-sided, and showed the kind of exclusionary tendencies predicted by Young (2002). However, they did not have the persuasive power that may be first assumed. The fishers dismissed and mediated the win-win argument through their understandings about their right to access and benefit from their coastal resources. How fishers further disarmed these arguments through rhetoric and narrative is the subject of the next two sections.

Narrative

Stories help bridge and explain divides in norms and understanding, while challenging the underlying assumptions of the dominant arguments described above. The difference between argument and narrative here lies in semantics: where an argument would be 'alternative livelihoods are not viable or attractive options for us', fishers commonly elaborated their personal experiences to explain their stance. Fishers routinely rejected alternative livelihoods as necessary or feasible options. At the same time, they wove narratives that deflected blame for overfishing and environmental degradation; claimed morality of their own practices; and established their need for material and other resources. Fabinyi (2012) has called this combination the "discourse of the poor moral fisher", highlighting how legality, morality and poverty are intertwined in an identity that is both blameless and deserving of help. This story makes its claim on others, through appeals to values of equity, justice and the 'right to survive' (Blanc-Szanton, 1972). Finally, improvised stories through game-play lent opportunities to further undermine the MPA/alternative livelihood arguments, incorporating different ideas about whose behaviour should be the target of external interventions.

Rejecting alternative livelihoods

Fishers rejected the argument that alternative livelihoods were available and accessible with personal anecdotes. For example, in a discussion about the availability and

remuneration of different jobs, a fisher exclaims: 'My child, just join a poultry business. You can go and clean up the poo there.' The statement has its fair share of both pathos and ridicule: the implied comparison here between cleaning chicken manure for a pittance in someone else's business and the relative freedom and fresh air of fishing on the open ocean is clear. In another area, fishers told facilitators that the local factory did not employ 'old' people like them, and that they had been rejected for any roles past the construction phase. They also pointed out that low catches and associated poverty were not only connected with overfishing, but also with structural exclusion from local fishing grounds, by the very industries that were refusing to employ them.

Claiming morality and establishing need

As discussed, one of the workshops' central arguments was that small-scale fishers have a role to play in reducing overfishing and coral reef degradation. However, fishers commonly provide the counter narrative that 'illegal' gear is to blame, while their legal gear cannot and does not cause damage. Fishers reiterated this through gameplay. ReefGame has 'illegal fishers', automated entities in the game's supporting computer model, originally intended to elicit discussion around enforcement without accusing individuals of illegal practises. However, in the workshops they became scapegoats for poor economic and environmental results. Participants also conflated 'illegal' with anyone 'not from here' *('di taga-rito*), where 'from here' is a flexible and evolving concept, shifting with migration patterns, economic fortunes, political alliances and kin ties (Fabinyi, 2012). Despite facilitators' earlier normative commitment to trying to 'transmit' a feeling of collective responsibility for overfishing, during gameplay they tended to reinforce the 'blamelessness' story, repeating the cry of "they (the illegal fishers) are not from here" and encouraging fishers to work out ways of stopping 'them' from encroaching. In this way, fishers managed to recruit facilitators to their perspective, through reinforcing their story: marine degradation was not their fault.

Blaming 'illegal fishers' for environmental problems is central to the fishers' self-narrative as 'good'. Fishers also communicated the close association of their own livelihoods with moral behaviour through references to 'other' ways that they could be earning money that would not measure up to the moral standards they expect of themselves. This was most often done through reference to either money-lending or drug trafficking, both professions seen as both inherently morally questionable and seeking to profit from the hard lives of the poor. They did this through hypothetical statements such

as "(if) we go into drugs just once, ah, (we'll be) millionaires." In choosing to eschew 'dirty money', fishers were reminding facilitators that any 'alternative livelihoods' may not be as benign as their current one. The idea of giving up fishing was regularly presented as involving great personal sacrifice – both in the Christian sense (for the good of the collective, to become a coast guard to watch over the fishery, for example), and as personal moral compromise (to do something that was less ethical than legal fishing).

Closely related to this moral discourse, is small-scale fishers' perpetual poverty, and recurring need to ask for material support for basic survival. As argued by Cannell (1999: 228), the Filipino poor must "spend a great deal of time" persuading others they deserve help. The intertwining of the fishers' moral livelihood with persistent poverty becomes part of this story. Within the workshops, fishers did not tend to make direct appeals. Rather, the fact of their 'game' poverty, described as being in debt or bankrupt, was the subject of constant commentary. The examples above of how alternative livelihoods were not accessible, how fishers are excluded from their fishing grounds, and how they are not responsible for falling catches, all become part of a story which has only one possible conclusion: the fishers need help from those with more power and resources – all other participants. The workshops, then, are an opportunity for the fishers to relate this story to people they do not normally encounter, establishing at least a temporary relationship, in which persuasion and recognition of obligation may occur.

Not all the fishers' stories implied deficits. Rather, resilience, optimism and inventiveness in the face of scarcity were also consistent themes. Luck is an ever-present possibility in a life of fishing – and a 'jackpot' catch can up-end the economic hierarchy, if only temporarily (Mangahas, 2004). As one player said: "[The fishery] won't go under…tomorrow's a new day". Showing less hope and more resigned determination, after several rounds of poor catches, another fisher opted out of the game entirely, stating he would "just stay home and eat cassava". Cassava is a low-status, but easy-to-grow carbohydrate for poor families. The statement represents the fishers' ability to survive with their skills and resources at hand and rejecting the rules of the game we offered. We take up this alternative self-presentation further in the next section.

Going off-script

Facilitators used the game structure as a chance to improvise, telling stories that tapped into culturally salient ideas of government complicity in bribery and corruption, and personal resilience and entrepreneurship. These alternative stories extend and give

nuance to the competing tropes of the destructive/moral fisher. Other participants enthusiastically engaged with, and elaborated on, these 'off-script' moments, creating a collective story to challenge and add local colour and complexity to the win-win argument discussed earlier.

Nepotism, bribery and corruption came up consistently across workshops. This is illustrated particularly well on the occasion the facilitator took the capture of an 'illegal fisher' as an opportunity to probe the local process for dealing with encroachers on fishing grounds. Spontaneously taking on the role of 'mayor', the facilitator declared an election. She further announced that she's open to leniency because it might give her a boost in the polling booths. Chuckles followed; tellingly, no participants showed signs of shock or disbelief. Fishers joined in, saying: yes, the mayor is open to persuasion, especially for first offenders, especially for people from big families with lots of registered voters (paraphrased). The LGU representative concurred initially, laughing and confirming that (voting) first offenders may well be able to 'get away' with not paying a fine. Banter and exchange continued, but some fishers also began to question the fairness of such secret deals. At this moment, the LGU representative started to backtrack, saying "maybe you'll get the wrong impression. It's not like that just because there is an election. The mayor doesn't give special consideration to those types". The fishers fell silent: none offered dissent (or assent), but the story lost traction. Soon after, a break was called and the conversation was lost. The example demonstrates how the game facilitated broaching a challenging topic (corruption), but also how that this discussion does not necessarily lead to meaningful change. It stands as tantalising evidence of the necessity, difficulty and means of broaching difficult topics – and how stories can point to alternative configurations of who is the source of problems in Filipino coastal communities – but not how to broker a resolution.

In another example, the facilitator decided that the fishers had done "too well' and were getting complacent. She told them that their 'children' (who function in the game as a way of looking at household livelihood diversity) had 'died' in an epidemic. The reaction was instant: mock wails, and loud recriminations from the fishers. Almost immediately someone suggested that they should set up a funeral parlour. In previous rounds the fishers had been setting up micro-businesses (including the 'beer house with girls' mentioned in the opening vignette). Several players now clubbed together and asked if they could open a parlour together. It is black comedy, but one that has important implications for the way the fishers self-present in mixed company. Here, instead of

presenting the poor, moral fisher, object of pity and deserving of charity, the fishers presented a very different character, one who is wily and resourceful even in the face of great challenges.

These contrasting examples offer insight into how paying attention to Young's communication modes helps understand workshop interactions. By embellishing the facilitator's suggestions with details and jokes, fishers endorsed and adopted her stories, confirming their cultural salience, alongside their own stories of rights to livelihood, ethical behaviour and collective responsibility. This is an advantage that game play has that other activities may not. The same facilitator claimed participation was much higher in game sessions than what she observed in more 'usual' workshop activities, where you often got "blank faces". Her willingness and ability to go 'off-script' also encouraged an unruliness, creating discussions that are much more difficult in more controlled activities. As Green (2003) points out, unexpected outcomes from workshops become increasingly less likely the more standardised the activity. Opportunities for exchanging stories, or in Filipino terms, for explaining significance and relevance across different groups *(kasaysayan)* (Mendoza, 2007) demonstrate how marginalised groups mediate and adapt the stories of the powerful to meet their own needs (Sundberg, 2006). However, without a means of furthering the discussion beyond the workshop contact zone, these stand as moments of unrealised potential, rather than examples of democratic deliberation and resolution.

Rhetoric

Throughout this paper we have called attention to the rhetorical attributes of the different modes of communication presented. Through greeting, we argued that friendly, superficial exchanges help establish the recognition and obligations of a common humanity among participants, setting up the possibilities for relationships extending beyond the workshops themselves. In argument, we concluded the fishers' silence and withdrawal was an important message of resistance and dissent. Under narrative, 'serious' issues like corruption were canvassed through jokes and laughter, if not resolved.

Joking about the 'ugly' side of life, poverty, inequality and the immoral behaviour of those with both power and resources, is a constant companion in the Philippines (Cannell, 1999). In this sense, the workshop contact zone offered a chance to make those jokes in the hearing of at least some of those to whom admonishments and claims are directed. One of the rhetorical functions of joking and ridicule, after all, is drawing attention to

undesirable practices (Grabosky, 2016). As pointed out, that certain discussions were shut down with the refrain "it's just a game" suggests that how to link 'calling out' to efficacious reform is an open question, but public discussion at least lets those in authority know that they are being watched.

Finally, Young's call to pay attention to how rhetoric provokes emotion drew us to reflect on our own responses to participants' communication modes. Where they were lively, we were pleased: the workshops were serving their purpose of 'bringing people together'. When they were silent, we felt frustrated and disappointed. Note that the critical mass of fishers, versus other participants, meant that their emotional reactions were dominant in a way their voices rarely were. This shows how workshop contact zones can become "outbursts of emotional labour" and "projections of desire and hope" (Packendorff and Lindgren, 2014), rather than spaces of an exclusionary, rational discourse. If we privilege workshops' role in forging emotional connections among different groups of people rather than imposing particular understandings of the world – which, as we have seen, is provisional and uneven at best – then they cease to be mere vehicles for dominant and exclusionary conservation narratives. Whilst the workshop contact zone is temporary, and offers limited ability to solve long-term problems, relationships forged through episodic encounters could provide the seedbank for collective action and learning.

Conclusion

This article began with a vignette that attempted to capture the messy, often disappointing, experiences of participating in stakeholder workshops. Our hope was the story would resonate with others who had similar experiences, and who are looking for fruitful methods to both describe these experiences and explore means of improving them. Understanding workshops as 'contact zones' gave us an avenue to unpack the uneven performance of both workshops and the tools used in them, in a way that could grapple with the power disparities and frustrations but also the "mutual understanding,…new wisdom…[and] joys" (Pratt, 1991: 6).

Young's aspirational framework, then, helps us to delve deeper into workshop micro-interactions, and why these often fall short of participatory ideals of inclusion and justice, while expanding opportunities to see ambiguities, compromises and resistance. We augmented her theory of communicative democracy with insights from Philippine psychology's sensitivity to the cultural context, and the contingent and partial nature of power relationships. Applied to our case study, we saw how although fishers' voices were

often dominated by the rational arguments of other participants, these arguments did not have the discursive or practical power one may first assume.

Instead, analysing the other communication modes revealed how the fishers' mediated the conservation win-win narrative. This points to how 'unruly' activities, like games, can disturb attempts to create consensus, albeit in temporary and contingent ways, while helping participants practise self-representation that moves beyond the trope of the 'poor, moral fisher'. The fishers and facilitators wove collective stories that told of structural exclusion, blocked opportunities, and resilience in the face of oppression that deflected blame from the fishers for the poor state of the fishery. Instead, responsibility was framed collectively, with the fishers as ethical and capable citizens, who could nevertheless benefit from a helping hand from better-resourced others. Along with stories, rhetorical devices, including both laughter and silence were signals of resistance. Jokes also helped introduce usually taboo topics, and negate the terms of the arguments presented by authority figures. While our game assisted to strengthen these often less-valued communication modes, other activities may be equally effective – role-play, story-telling and improvised theatre, for example.

Much of the limited critique specifically directed at workshops references the suite of 'standardised' activities, such as those associated with creating logframes and participatory rural appraisal (Green, 2003). Perhaps disturbing those templates with activities that were playful and encouraged improvisation increased opportunities for the non-argumentative modes of storytelling and rhetoric. Further, we noted that opportunities for cross-sector one-on-one interaction within groups may be particularly important for facilitating more equal interactions. This practise at speaking up, is a "necessary intermediate step…to influence decisions" (Agarwal, 2001)

Finally, Young's concept of greeting, together with Filipino concepts of 'shared humanity', with the obligation and vulnerability that brings, allows us to see how workshops help create the pre-conditions for inclusive participation. The co-presence of citizens through face-to-face meetings is a minimum necessary first step for conservation for development projects: first, we must create a 'contact zone'. Without co-presence, the ability to create inclusive spaces for democratic processes that will work for both humans and the ecosystems that support them is lost. Even when workshop outcomes do not immediately appear to bring us any closer to either justice or sustainability, we believe they are helpful 'rehearsal spaces', helpful for learning how to reconfigure social and environmental relationships.

Perhaps, then, the most important aspect of Young's communicative democracy framework is the sensitivity it brings to both practise and analysis. To this end, Table 1 contains a set of questions and guidelines, which could serve as both planning document and evaluation schema. Understanding the communication modes helps researchers and facilitators watch for and create opportunities to enhance the voice and influence of those who are often excluded, even when they are 'in the room'.

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5. Fishing for a career

Knowledge culture	Sources of evidence	Sources of dismissal
Holistic 	Imagination Creative leap	Airy-fairy Impossible Impractical

Adapted from Brown (2004; 2010a; 2010b); no comments from peer review at time of submission.

Overview

The fifth and final paper turns the lens away from the FindFishSup project back onto the doctoral process in a final fishing expedition to capture 'the core of the matter', the essence of the holistic knowledge culture according to Brown (2010b). As flagged in previous discussions, I have serious questions about the ethics of scholarly production in the world of commodified science and late capitalism – this returns to the question of for *whom* does the game work – *cui bono,* who benefits? This piece reflects on the impact of participating in an attempt at scholarly transformation on my *self* –my body, mind and work, and uses these observations to both critique current practice and build an alternative vision. To do this I attempt a diffractive *reading through* (Barad, 2007) of my own livelihood experiences with ethnographic accounts of the fishers', drawn from my own and others' research. The elements of resonance and dissonance in these accounts help derive some ideas as to 'what next', the ultimate question of an open transdisciplinary inquiry (Brown, 2010b).

Like the first paper, this is explicitly an autoethnography, which Mary Louise Pratt (1991) calls "a method of the contact zone". According to Pratt the specific purpose of autoethnography is to amplify the voices of traditionally subjugated people in ways that expose oppressive and imperial practices. As a colonial presence in the FindFishSup project, my personal voice could not achieve that. Instead, what I tried to do in this last piece was upend the usual logic of academic theory being applied to subaltern actors (Connell, 2007) and instead apply the logic of subaltern actors (fishers) to an academic theorist (me). It is for this reason, as well as the tentative attempt to stake out an alternative livelihood strategy for first world academics, that I claim the piece as being a holistic "creative leap" as per Brown's typology.

At the time of writing this summary, this piece had been read by my boss, my mother, four friends, my lover and a mentor, but had not yet received reviewer comments from the editors of the special edition 'Academic Poverty' for the Journal of Working-Class Studies,

where it was submitted in May 2017. These people are all members of my place-based community, so it is hardly surprising that they accepted its affective and normative evidence as moving and authentic. Disciplinary evaluation is likely to be harsher, and perhaps mirror the critiques of unclear 'falling between' that the hope essay received. As with a number of loose threads you will no doubt have noticed in the telling of this tale, this one is being left dangling in the wind. The creative leap necessary for holistic visions involves aesthetic judgments, which often suffer similar fates as individual stories – dismissed under accusations of laxity, singularity and non-applicability (Brown, 2010b). Like my performance being judged as "akin to a non-musician" by a reviewer for the first scholarly paper I submitted (Cleland and Wyborn, 2011), it seems likely that this piece may also be considered the work of a mere amateur. That, however, is still an improvement over the 'non', and so the spiral continues.

Paper - Fishing for a career: alternative livelihoods and the hardheaded art of academic failure

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Abstract: charting the course

The world of alternative livelihood research brings a heavy history of paternalistic colonial intervention and moralising. In particular, subsistence fishers in South East Asia are cyclical attractors of project funding to help them to exit poverty and not "further degrade the marine ecosystem" (Cinner *et al.*, 2011), through leaving their boats behind and embarking on non-oceanic careers. What happens, then, when we turn an autoethnographic eye on the livelihood of the alternative livelihood researcher? What lexicons of lack and luck may we borrow from the fishers in order to "render articulate and more systematic those feelings of dissatisfaction" (Young, 2002) of our life's work and our work-life. What might we learn from comparing small-scale fishers to small-scale scholars about how to successfully 'navigate' the casualised waters of the modern university? Does this unlikely course bring any ideas of "possibilities glimmering" (Young, 2002), as critical theory promised to do?

Part 1: shipwreck

It is 2012, and I'm at the world's largest Coral Reef Science Conference: over two thousand delegates, held every four years, marine science's equivalent of the Olympic Games. It's two months after the abrupt failure of my marriage, perhaps two weeks since my father was diagnosed with operable cancer, and almost two years since the completion of my doctoral fieldwork. I am presenting in the 'socio-economic stream', which is somewhat drowned out by the eleven other parallel sessions on various aspects of coral and fish ecology. Real science has invited the social in, but only as a side-show.

I'm bright, but brittle, as I take the stage to give my paper about using simulation games to encourage small-scale fishers into alternative livelihoods, the result of work in a project entitled 'Finding a Way Out for Depleted Subsistence Fisheries' or FindFishSup. The argument seems straightforward: the sea is overfished, so let's stop people fishing. I describe our workshops in the Philippines in mostly Pollyanna terms, emphasising the laughs and the learning rather than the silences and doubts. The cracks probably don't show as I bumble through, since it's a modified version of a talk I've given at several other

conferences. I learned this recycling manoeuvre early, it is one of the tricks of my trade. Conference talks, networking, asking pertinent questions: these are the core skills of this livelihood of mine that, on the surface, looks so different from the fishers' one, out on the ocean-blue. However, as we shall explore, it seems the current global epoch has us both at the end of the proverbial line.

After my talk, as I dress and prepare for the conference dinner, I think, well, that went ok. Piece of cake. My writing may have stalled, but I can still hold an audience.

The dinner itself is held outdoors: two thousand people are too many for most venues in this smallish tourist town. I am in my element: this is my crew. Old friends, new mates, vague acquaintances and perfect strangers swim past in a swirling pool of excited conversations. I flow between groups and languages; overindulgence in the free wine is making my tongue both mellifluous and artificially dextrous. I love the feeling of little electric connections being made in ever-expanding circles. Currents flow thick and fast among the teeming school of academics. Here I find a Costa Rican ecologist who knows my tiny fishing village where I'd lived for about 6 months as a volunteer. There with my labmates from Manila. Here again with the Germans I'd accompanied on a dishevelled research cruise in Sulawesi back when my doctoral research still sparkled with unrealised promise. Each experience adds colour and texture to my tapestry of knowledge about small-scale fishers from elsewhere and their responses to our global problems. This is the gilded edge of academia, a global community gathered together in a ritualised cultural celebration. It's our work, and we *love* it.

Can conference dinners be compared, perhaps, to the 'jackpot' moments of the fishers? Where a large landing is secured, and by osmosis, or just gossip on the wind, and representatives from all households turn up on the beach to take part in the joy of the successful labour of the fishers, and take part in the sharing out of the catch (Mangahas, 2000)? More planned, perhaps, but still with the sense of ceremony, the guarantee of a good feed, and the subtle yet persistent knowledge of an unspoken hierarchy, which influences proceedings in ways that do not start or end with the event itself.

Back to our dinner. When the venue is emptying at around midnight I wander up to a friend from a long-ago project. She's talking to two men, one of whom I know vaguely. She introduces me to the other. I lapse into clichés. He's tall, dark(haired) and handsome, and, as an aside, known to have leapt up the academic ladder with the greatest of ease after completing his thesis – which was written at the same time as he was completing

several lucrative consultancies. His livelihood is certainly looking a lot more secure than mine, dangling, as I was, at the tail-end of a stipend scholarship. Opposites attract, etc., etc.

We snap, crackle and pop as we move on to a sleazy backpacker club with other delegates. His hand brushes against my thigh as we dance to top 40 pop, and, as the delightful Filipino expression has it, my underwear tingles. We leave together.

As we emerge onto the street I realise I have no idea where I am. Like so many other shared traits with Norman Rush's protagonist in Mating (the one who was working her tits down to nubs on a thesis that didn't exist)(Rush, 1992), I too have topological agnosia, an inability to locate myself in relation to my surroundings. Consistently disoriented, I sometimes wonder if my internal map is aligned to some other place, one that might be accessible by portal once the physicists get all their god(damn) particles worked out. In an escalating series of reciprocally terrible moves, Assoc. Prof Tall, Dark and Handsome and I agree to go back to my apartment. Somewhere amid this, he reveals he has a wife, and my axis falls further out of line. Talk turns to promises of platonic behaviour.

After, he tells me I need to let go. I let go. I'm no longer bubbly, buoyant, I crumple, my spine sags, defences drop. He says, "I can't stay". I nod. He says, "I'm going," and I say "go." He leaves. The departure of this exemplar of white, male academic perfection seems prophetic in retrospect. Is it rejection or abstinence, and who gets to decide? My feeling of being left behind, role-less, begins there perhaps: marooned, stranded, alone.

The next day, back at the Conference, I am once again brittle, but bright. I bounce through sessions and have a coffee with someone who saw my presentation and is intrigued by the approach. However, my batteries are running very low. I receive emails in the following weeks, requesting advice on participatory methods in poor countries, and, for the first time, I bin these without responding. Circulation of academic goodwill, the exchange of free knowledge and advice, this is the bread and butter of collegiality and collaboration: what gives life to academia's global workplace, and not infrequently secures employment opportunities. But when your butter pot is empty, and the bread is stale, who has the energy to connect with strangers?

I'm fraying. The toll of divorce, cancer, my project inescapably broken and delayed despite my sunny presentation. Cells, bodies, relationships, ideas all misbehaving, mutating, non-conforming. Butter, bread, ropes, batteries, these are the mixed metaphors of un-oiled cogs grinding against each other. Oops! There goes another one. I have nothing

left to feed the machine. Drowning in my own rhetoric, I can't possibly work under these conditions.

In the following months, I take leave from my PhD. First 6 weeks, then 12. Finally, after months of agonising stagnation, I decide to quit. In a quixotic move, the university offers no easy way of withdrawing from a PhD. I search fruitlessly through the depths of our website for an appropriate form. Instead, I can put it all on hold—for a year, two years. My therapist, provided free of charge through the student union health services, provides more documentation supporting leave, and I secure the relevant signatures. Leave is granted, and I pack up my office.

Part 2: Lifejackets

It turns out to be difficult to find work off-campus. The new conservative federal government 'needs' to find 'savings' and even those in 'permanent' jobs are being shown the door. In my town of government work and government contracts, the economy beats to parliament's drum. I end up tutoring again. It's my 5th 'casual sessional' contract at the university in half as many years. The money isn't bad, enough to pay the rent, and though the marking rate doesn't cover the time I spend googling suspiciously perfect sentences to prove plagiarism (an occupational hazard), I enjoy the face-to-face teaching in small groups. The students and I get to know each other, the exchange of stories, knowledge and experiences feels genuine and grounding. But in the four-month summer gap between semester 2 and the following semester 1, 'casual sessionals' do not get paid. My seasonal work is about to disappear.

In a lucky break, (or is it my winning ways? We shall return to this question), about half-way through the semester, the mother of one of my (local, high-quality, public) high school friends, who also happens to be a founding professor of one of our most lauded research schools, invited me to work for her. She knows I'm struggling, and has provided lunch, tea, and timely, sage advice since. Here again, a soft, gold-threaded pillow in an otherwise hard-edged world. This is what makes you keep hoping that just around the bend is security and fulfilment, or, at least, a nice place to work. The job – and handouts from my parents loosely associated with Christmas and birthdays – has kept me limping along ever since. These three facts (good public school, a job, monetary gifts) speak worlds of my life of relative ease and privilege. Failing, giving up, giving in, never getting started, were and are only a few suburbs away, so consider my complaints as soft ones, perhaps of the 'first world' variety.

For more than three years, the same length of time you are nominally given to do an entire doctorate, I have been working as a bottom feeder in the academic system. This should also not be a complaint: university bottom feeders are comparatively well-nourished. Although I only earned 70% of the Australian full-time minimum wage last financial year, my hourly rate is 228% of that (Australian Government Fair Work Ombudsman, 2016). This means I can work less than half the hours of, say, the cleaners I greet vaguely on the rare days I arrive before 8am, to reach my society's accepted subsistence level. This is such a luxury. Much of the agonised writing coming out of North America in particular speaks of the very real struggle of existing on casual wages, in places where there are no competing employers or accessible alternatives for most people who complete any kind of tertiary education.

Alongside my sporadic hours as a research assistant, my doctoral studies hobble on. For reasons I can explain but do not fully grasp, I cannot let my thesis go unfinished, even now long after the sunk cost fallacy has become a clear truth and the hardheaded, rational response would have been to give in gracefully. I stubbornly want that Dr: many (many!) journal entries attest to my sincere desire to have the right to a genderless honorific. If it seems shallow, a poor motivator, then feel free to judge. I have little status to lose in this world, so I will cling to this life craft of sorts.

In the spirit of "neo-liberal self-improvement" (Murray, 2013; Vijayakumar, 2013), I attend countless writing courses, enrol in Massive Open Online Courses to boost my time management and productivity, hire a writing coach I can ill-afford. When I finally finish the first substantive piece of writing in about four years in January 2016, I email an ex-supervisor jubilantly, inviting him to be co-author if he could give me some feedback and a bit of guidance about where to try for publication. A few weeks later he gets back to me, saying he cannot read it until September (he's flat out!), and I should put it in for a conference in the meantime. He reassures me about this daring recommendation, saying I shouldn't worry, his position on the conference committee would mean my paper would (luckily! nepotically!) 'get in'.

The casual assumption of the benefits and privileges associated with academic networks is, of course, well-placed (Burris, 2004; Sherren *et al.*, 2009). It's only now, on the fringes of other people's projects, that I realise what was offered early on. Attachments to people, projects and programs allows you access to more than just funding and your name on papers. It is acceptance, opportunities and a general sense of being part of an 'in-' crowd. Before the first year of my doctorate was up, I had: half a dozen collaborative

articles in the pipeline; presented at as many international conferences; and participated in countless professional development activities run by colleagues and colleagues of colleagues. Like so much else, this abruptly stopped at about the time of the events described at the beginning of this essay. The project funding my work finished, one supervisor retired, another moved fields and the third moved away. Like 'real' poverty, academic poverty is not just material, but rather social, political, emotional and psychological hardship and resource scarcity. It comes with crippling isolation, self-doubt, a sense of things going on around you, not with you, and an intuitive certainty that at some level the institution just wants you to *go away*.

Part 3: To fish or not to fish?

And why not leave? There is so much world outside these walls, notwithstanding my earlier inability to secure a job. And surely, especially for those to whom academic culture means nothing, a PhD is a useless adornment compared to a livelihood. Get a real job, bow to the weight of empirical knowledge that I, like most others, do not belong here. It is now oft-argued that PhDs are in oversupply (Cyranoski *et al.*, 2011). PhD training has in the past been specifically, if not solely, the entry point for a vocational career in academia. No longer: PhD students outnumber tenured positions with an estimated ratio of 1:20 (Crossley, 2013). Doctoral students are now offered an array of alternative livelihood workshops to prepare them for the seemingly inevitable alternative life outside the academy.

For those familiar with the 'alternative livelihood' nomenclature, this choice of words will seem odd. It is largely unspoken assumption that 'alternative livelihoods' are devised for the poor, rural and (mostly) brown, not the (relatively) rich, urban and (mostly) white. Indeed, it was a deeply unsettling experience when I realised that what I was doing to the fishers, the university was trying to do to me. I was perusing the latest offerings from our research education office, a team of dedicated, lively people, when the title 'PhD to Present' caught my eye. The idea behind the #refreshmentswillbeprovided workshop (Mewburn, 2016) is that livelihoods beyond the sandstone walls are available. Not only available but desirable! More money, more security, more of everything outside the campus. I recall, ruefully, the fisher who said to us "you want us to stop fishing, don't you? Then why don't you just come out and say it". I imagine the response if I were to say the same thing to the university's workshop organisers.

'Landing' a permanent academic job has indeed become the domain of the very lucky or very skilled, depending on your perspective. Armed with this knowledge, why do we still flock (school?) to doctoral programs? It's a pending question.

The very same discourse of luck and skill is discussed by Veloro (1994)in relation to Filipino fishers. Where control is elusive and stakes are high, rationality bifurcates. Those who do well attribute this to either internal characteristics (skill, or 'diskarte') or external forces (luck or 'suwerte'). Amongst the fishers, skill is more likely to be attributed where boats are big and fishing gear hi-tech. Material abundance gives rise to faith in one's own ability to command the tides of fate and destiny. Luck, on the other hand, is the purview of the small-scale fishers. Armed with hand-made nets, traps and spears, fortune's fluctuations are firmly out of one's hand. No-one's fault, just the way of the gods and the sea.

Of course, when catches are small and jobs are scarce then more people are out of luck. At this point, luck disappears as an explanatory variable, and the focus shifts to upskilling. The ones doing badly become the target of interventions that will give them the 'competencies' and pathways they need (Brien *et al.*, 2013). This is how particular groups are rendered the site and source of a problem, and the systems perpetuating said problem vanish from view (Ahmed, 2017). Circular logic becomes common at this point. As Christophe Béné mocks in his hypercritical paper on structural exclusion from fishing grounds, scholars have tended to fall into claiming people are fishers because they're poor and poor because they're fishers (Béné, 2003). We could easily substitute this with 'people are untenured because they're poor performers and poor performers because they're untenured', resulting in precisely the problem lamented regularly in higher education supplements and related popular publications across the globe.

Economic resources and socially enabled privilege are not foregrounded in the skills/luck framework. The idea of merit (I deserve this! I am skilled!) may take on special weight when your hold upon it is so tenuous – untenured. If, as David Mosse (2006) has argued, it is a matter of routine institutionalised practice that success is collectivised and failure individualised, we must point to high achievers as markers of a system that is working, and ask the losers what they are doing wrong.

I am sure part of my internal resistance to finishing my PhD (why else would I sit here day after day, not doing, not doing?) is from looking on at my long-finished contemporaries. Many are juggling multiple short-term contracts, where your time is up

just as you're getting started (Saracci *et al.*, 1999), and those who aren't facing cyclical contract expiration keep working hours that many (and I) consider barbaric in their length and intensity (Hemer, 2014). At least while I stay in undone limbo land, working very little (I must finish my thesis) and studying/student-ing even less (I must work), I have an excuse for every situation which more or less holds water.

Likewise, the fishers who participated in my simulation games (that I reported on at the conference which began our journey) were often very resistant to the idea of leaving fishing and joining the bottom feeders of market capitalism. This is really what alternative livelihoods usually mean – explicit encouragement into seasonal, precarious employment or becoming dependent sole traders of dubious economic viability (Wright *et al.*, 2015). One fisher put it rather poetically, recommending another to "never mind, just get a job cleaning up the shit", a reference to the unpalatable labour requirements so often expected of Filipino workers, both home and abroad (Semyonov and Gorodzeisky, 2004).

The fishers' stubbornness in sticking to fishing, even in the face of (unrealistically) highly paid and accessible other employment options within our simulation games, was commented on in frustration by government workers and scientists alike. "They're so stubborn", "I think they'll just die fishing" were common refrains. 'Hardheaded' is the literal translation of the expression for stubborn in Filipino (*matigas ng ulo*). It has none of the English 'hardheaded' meaning of being practical and realistic. Rather, it is commonly used as an admonishment. The same affective qualities appear in the bulletins and blogposts about the PhD glut. Even as some describe the programs as a pyramid or Ponzi schemes (2010), there are still undertones of condemning the irresponsibility shown in signing up to an activity so likely to end in failure.

It does beg the question: why? This is where the analogy with the fishers starts to collapse. Certainly, fishers are known to testify that they enjoy their occupation because of the freedom, the lack of 'a boss', and their connection to the ocean (Pollnac *et al.*, 2012): substitute ocean for 'field of study', our comparison still holds. However, the small-scale fishers' oppression by exploitative market arrangements, their vulnerability to climate change, their constant displacement from traditional fishing grounds, and the impacts of the usually unfettered access of commercial fishers to both high sea and near shore fisheries mean a precarity of existence that only in extreme cases could describe any urban student (Fabinyi *et al.*, 2013; Knudsen, 2016; Lim *et al.*, 1995). As the fishers told us in no uncertain terms. In many cases, if they had access to more attractive livelihoods, then most

would not hesitate to do other things. The fishers were being hardheaded in the English sense, practical and realistic.

On the other hand, however you frame it, labelling a PhD program as a livelihood of last resort is not convincing. We are attracted to it; enrolments continue to expand despite the disgruntled whisperings from within the academy and without (Cuthbert and Molla, 2015). Why? Let us centre the figure of the autonomous scholar: this is what institutions foreground as the outcome and therefore 'the point' of PhD programs (Harrison, 2010). Here again, the idea of being free, having no boss. Further, it is a way of 'being productive' without creating the material waste so symptomatic of other areas of modern western culture. By not selling anything, we are not forcing anyone else to buy.

But does this logic hold? The academy's distance from capitalist relationships of production has never been shorter (Thornton, 2015). I shall never forget how I mistook my first cheque for a popular journal article for an invoice. We academics are so alienated from the products of our labour that it is more common to pay than be paid. The battle to retain intellectual property rights over the knowledge (or other) products of student research is a battle that has but temporarily subsided in my university, as it moves to position itself as an institutional, intellectual bourgeoisie. Intellectual property, after all, is "what we produce", and my institution owns (Thornton, 2015, p33). So, in a quest to understand the pull, I still end up confused – if I had understood the route, would I have started the journey?

Part 4: If the sea is empty, should we encourage fishing?

Before I went into the field to meet the fishers, the university rightly insisted that I pass an ethics committee assessment. An ethics application revolves around the risk of causing harm, and the distribution of benefits. The risks must be considered reasonable and the benefits adequate if the research is to be given permission to go ahead. As a thought experiment, I wonder what the university's ethics application for enrolling a PhD student would look like? How would the potential harms be identified? To whom do benefits accrue? If we put the reported levels of mental ill-health, physical malaise, and hours that would violate labour codes in other industries (Lucia, 2016) together with the alleged economic gains the university stands to make from each graduating student (Brien *et al.*, 2013), it looks like a very lopsided equation. I wonder again if the required disclosure of risk now being demanded of doctors and medical specialists around the Western world

were applied to our admission offices (Alani and Kelleher, 2016), how long this 'PhD Ponzi scheme' would continue to operate.

What, then, of my current limbo state, occupied by so many in today's corporate university: as both PhD student and casual employee, I sit in the centre of the Venn diagram of the university's growing labour problem. Tied up, but not tied in, we wonder what we should do: to accept and valorise our casual state may be to relinquish the gains made by workers, such as sick pay, long service leave, maternity provisions. Alternatively, maybe we just keep muddling on, occupying small spaces ethically, diligently, and with a strong splash of defiance. In support of this, the vision offered by O'Gorman and Werry (2012) is an attractive one: we may "slip the yoke of commoditization by failing to achieve permanence, failing to offer the bankable rewards of virtuosity." We can deliberately puddle around, be unproductive, opt out. This pathway is still risky though, as these authors warn: "Failure hurts. Failure haunts. It comes laced with shame, anger, despair, abjection, guilt, frustration." Not to mention no necessary connection with, or contribution to, a collective realisation of an alternative society.

It seems fitting that around the time I started writing this essay, my mother told me she wished I worked more. I think of my community-making art projects, my volunteer English teaching, my endeavours for our food co-operative, my vegetable garden, my lover and his children; but still her comment rankles, even though I know it comes from a place of love and concern for my security and wellbeing. As Halberstam (2011) has written "it is grim" to push against individual success, that logical linking of achievement, (protestant) ethics, and personal worth inside the indispensable collective.

In a culture that does not value that which does not add monetary value, those without career aspirations do not fit. Value-as-price so often contradicts value-as-moral. Likewise, within an economic system that demands efficiency, surplus and a link between supply and demand, many small-scale fishers and PhD students/graduates are excess to requirements – the ultimate failure. I think again of the fishers: in the fishing game we played, they would subvert our Boolean rules of fishing OR 'alternative livelihood', somehow managing to wrangle it so they could always have fishing AND 'sideline' activities. Fishing is not just marginal subsistence. It is instant fresh food, the satisfying deployment of a hard won-skill, privacy from an invasive world, all these intangible and tangible pleasures rendered invisible by that question: 'how much do you earn?'

Part 5: A way out of depleted, subsistence fisheries?

Late capitalism does not offer any easy alternatives to this question, and expecting an individual answer to a collective problem is dicey at best. Even so, another thought experiment: how might we reconfigure our values-as-morals? One small idea, a start, one coming straight from the laboral pastiche entailed by casual and intermittent academic work. An expected pleasure of my unearned privilege of being able to survive working less than pleases my mother has been having time for other activities. Exploration in free time has led me, among other things, to performance, physical theatre and dance. I've come to think that if the outworkers of the university come to define themselves as what they do after hours, as did the moonlighting fishers, then we may have the workings of a plausible labour alternative on our hands.

With this we may start to reclaim territory, what we *are* will no longer be merely what we *do* in exchange for money. And as Gibson-Graham have argued, breaking open the cracks of our overworked society is aided by a stubborn (hardheaded even?) focus on the nascent possibilities of non-capitalist transactions (McKinnon *et al.*, 2008). Just as fishing is primarily food and a life on the waves, not a cash income, wherever possible perhaps we can prioritise everything non-monetary. That may be morally valuable, a reconfiguration that is meekly revolutionary.

So, to bring the story back to me, the protagonist and story-teller, and whether I will fish for a career inside academia's ivory walls. No. I will make art, and I'll be a Research Officer as long as my contract holds. I will take my real work, my precious work, my heart work, into a world of ensemble performance, where to speak of individual achievement betrays the ethos, the practice and the product. Sometimes the star, and sometimes the chorus, sometimes on stage and sometimes on page, I can work with others to create inside, outside and beyond disciplinary divides. I may well continue to be poor: poorly received, poorly remunerated. It's a gamble requiring both luck and skill, a precarity embraceable only because of the cushions of class and education. I wonder if I can spread my safety net to capture the falls of others. Perhaps, in my state of minimal work, I can let "contented idleness…(be) the succulent mistress of creativity" (Wendt, 1980), thereby helping devise collectively ingenious ways to instigate transformation necessary so that 228% of the minimum wage is the standard rather than the exception, in both directions. The fishers I will leave to their own devices: they do not, and never did, need me.

I think back on the conference, and realise I wasn´t stranded, but invited to strike out for a different shore. In company, always in company.

Welcome to our side-show.

Conclusion

Self portrait disguised as a proper artist
(Matilda Michell 2016, reproduced with permission)

Overview

This thesis was a story of hope being lost, and then recovered through a protracted period of distilling disappointments and failure to extract constructive proposals to contribute to more ethical research, better participation, more fish and less poverty. In this I attempted to follow Iris Marion Young and others who urge us to see the 'possibilities glimmering' in an otherwise gloomy scenario (McKinnon *et al.*, 2008; Young, 2002). It may seem like a paradox doomed to failure to set off on a quest for sustainability, inclusion and justice through the auspices of a short-term project, in a foreign country, using a game in one-off interactions with a very small sub-set of the human actors involved in the fishy scenario as painted at the outset of this thesis. Indeed, as an isolated intervention, the game and the workshops had limited demonstrated capacity to affect sustainable fisheries management, fisher wellbeing or a straightforward doctoral project. What, then, did I learn from it; what are the 'possibilities glimmering'? And finally, how do we play ethically with fishy problems, that is, how might development researchers ethically intervene in sustainability, inclusion and justice challenges?

Possibilities glimmering: did the game work, how, for whom and why?

To uncover the 'possibilities glimmering' and answer the question of the use and usefulness of the game, I transformed Valerie Brown's (2010) knowledge cultures framework into an autoethnographic lens with which to revisit my field experiences through five vantage points. Each 'cut' shed light on the research question by considering 'did the game work, how, for whom and why?'

Firstly, *Hope*, published in 2011, suggested that ReefGame operated under a theoretically-informed 'hope' framework, useful when engaging in a research field prone to despair. This has become ever more pertinent in the years since, as the global fisheries and coral reef crises have accelerated dramatically, causing scientists to weep over their data, among other moments of pathos and tragedy (Lockie, 2016). Through integrating autoethnographic and philosophical observations, I argue that hope-centred research, facilitated by play, is key to moving beyond a sad paralysis. This paper, however, also introduced one of the key structural limitations of this intervention: ReefGame's underlying capitalist premise ruled out the imaginings of so many alternative futures. It is hard to predict what a different, more openly conceived game-like intervention may have been useful for. Even considering the limits of ReefGame, there were the moments of "joy

and laughter" described by McKinnon as "crucial to establishing good foundations for community development work" (2016).

Further, ReefGame was useful for building the trust and relationships considered vital for effective and inclusive fisheries management, as well as creating knowledge (Cleland, 2017a). Explaining the game's design, *Viable metaphors* argued that ReefGame worked to facilitate engagement and learning because it was suitable, playable and recognisable. This introduced the idea of how games-in-workshops operate as 'practice spaces' for inclusion that was elaborated in *Rehearsing inclusion*. In *Rehearsing inclusion*, through extending Iris Marion Young's theory of communicative democracy by integrating Philippine psychology, and applying it to analyse the workshop 'contact zone', I concluded that the game offered opportunities for improvisation, play and communicative resistance that subtly challenged existing power structures. This was despite the limitation of the game as explicitly reiterating narratives that consider small-scale fishers as the source and the site of coastal resource management problems but never as having the assets and agency to fix them.

Playful shift, on the other hand, focussed on ReefGame's contribution to scholarly knowledge through an empirical lens. Through analysing the gaming decisions made by fishers, I concluded that insights from the game usefully complement those from more traditional 'extractive' methods, such as surveys, when considering pathways out of the fishery. Specifically, that centring non-economic considerations, meso-economic contexts and a focus on the 'next generation' could assist creating more effective livelihood programs for fishers.

All in all, plenty of 'glimmering' is now mostly preserved within the peer-reviewed world as an external marker of how I have made a 'contribution to knowledge'. The matter of '*cui bono?*', 'to whose benefit?', embedded in my research question, however, could be turned on myself and the institute that sanctioned these activities; the university. The diffractive reading of mine/fishers' livelihood carried out in *Fishing for a career* may appear an unseemly comparison, especially because I stand to benefit directly from obtaining a doctorate (hopefully) based on my interference in their lives, whereas their situation remains worsening, if anything. However, it does help to answer the question 'who did the game benefit', and, aside from the glimmerings noted above, the answer is me (a bit) and the university (a lot). What I can ethically do with that knowledge is where we turn to now.

How do we play ethically with fishy problems?

In asking the overarching question of how might development researchers ethically intervene in sustainability, inclusion and justice challenges, I centred the issue of responsible research in this gaming context. Now, I wish to offer three ethical principles for researchers wishing to conduct research ethically, fruitfully, creatively and hopefully. These principals are not to be found inside the papers, but rather form the meta-story of the scholarly project of trying to responsibly research and write the lives of relatively disadvantaged others (Fisher *et al.*, 2015). They are informed by a decade watching projects reinvent themselves on mouse-like exercise wheels across the field of conservation for development, yet not having watched a single 'end-user' (i.e. small-scale fisher, beach gleaner) celebrate a transformation in their ability to live a safe, good life that looks anything like mine. Similarly, I have not witnessed anyone like me, with relatively high levels of economic, environmental and social security, achieve a transformation in their own materially and energetically greedy lives. What follows is a manifesto for a research practise I can live with.

1. Offer something
2. Fail differently
3. Do not tell a single story

Researchers should offer something to participants. In the Philippines it is customary to give a gift when visiting or returning from a visit. The gift is called *pasalubong*, and is usually small, decorative or consumable rather than functional and long-lasting. Like other ritual exchanges embedded in an evolving culture, *pasalubong* cannot be precisely translated nor pinned down to a single meaning. However, at least one acknowledged aspect is how the practice recognises the giver's luck and gratitude –to be able to go visiting, to return from visiting –these are marks of a blessed life (Fernandez, 2002). And so to the foreign researcher, to whom so much taking is historically ascribed (Enriquez, 1979), even under continuing assumptions of contribution (see the above paragraphs for five examples), it is incumbent to make a sincere yet inevitably inadequate gesture of acknowledgment, to give *pasalubong*. To attempt to make a material offering, yet recognise and commit to repair and redress the incommensurate nature of the exchange, and remain entirely aware of the people to whom gratitude is owed. I offered our participants the game I re-devised, our project offered, at least, meals, and a short video. All three are offerings that brought joy and laughter into the workshops. This is "crucial", this is "central" (McKinnon, 2016) to the hope project (Braithwaite, 2004c), and, indeed, empathy and

collegiality (Mountz *et al.*, 2015). The game is a small thing, and in many ways a decorative thing. I made and helped make: gameboards, a computer program, *papier mâché* boats, colour profiles, posters and instruction booklets (see Appendix 4). It is not enough, but it is better than nothing, and that, too, is hopeful (Young, 2002). This principle does not come from any of the papers in isolation, but from the textual substance of the thesis: like the value of the short videos I wrote about in the introduction, it is 'felt with the bones'.

Secondly, the research community should encourage deep, radical, alternative failing, when attempting to create change in our life-worlds and those of others. Democracy, justice and sustainability are grand projects that have millennia of failure behind them: (Connor and Dovers, 2004). Yet, for all but a very few researchers, the material conditions for life are guaranteed in ways that are utterly inaccessible to so many others. We must risk more, not insist on continuing incremental success in grooves that have cemented and rewarded inequality on every scale conceivable to our species. I only wish that I had stepped out on such a path at the start of my PhD, and in this I certainly failed. I did, however, take a risk in trying to write this thesis differently: in being both critic and believer (Braithwaite, 2004a), in taking five provisional stances not one strong one. Others have signalled the dangers of unauthorised voices, like PhD students, attempting to "write difference differently" (Fisher *et al.*, 2015; McKinnon, 2016; Rendle-Short, 2010). But simultaneously there are deep rewards in being generative, in finding ways of bringing better worlds into being (Fisher *et al.*, 2015).

I also did believe, and still believe, in the possibility that a playing a game can be a little, bounded opportunity to do things differently, to not simply 'live amongst' or 'ask questions', or treat participants as "someone sleepy in a meeting room whose role is to hear what is said and clap at the end" (Cameron and Pukmai, 2007). In creating a non-world world through games, we can fail differently in a journey of finding a future that looks radically different from the present. This, I believe, is more generative, it creates "more, not, less participation in the struggle for a just world" (Cox, 1969) than cases where fun, hope, creativity and play are ignored. I am not alone: it has been said "play undoes or deactivates sovereign power by re-arranging and re-purposing its tools, goals and procedures…play is both creatively and socially productive. It cues social effervescence, euphoria, even ecstasy. In re-arranging rules and re-defining goals, it also re-shapes space, time and modes of interaction; it has both an overturning and a restorative function" (Lushetich and Fuchs, 2016). Overturning, and continuing to turn over and over, is surely an important step to transformation given that we have to keep using the same ingredients of ourselves, our

colleagues, our hands and our brains. The 'fail differently' principle means: research boldly and invite failure on a small scale and large, do not timidly attempt micro-variations on a rusty theme and do not compromise values for dollars or academic accolades.

My final principle for an ethical research practice is this; do not tell a single story. Novelist Chimamanda Adiche (2009), in her speech *The Danger of a Single Story* wrote: "when we reject the single story, when we realize that there is never a single story about any place, we regain a kind of paradise". It is a core belief of the university-as-institution that a dissertation needs this one central argument. I recall having what is best described as a tantrum after being told for the umpteenth time that I best work out what mine is. I declared in that moment that, at the final moment of distilling, the message was exactly that: do not tell a single story. Refuse, resist, deny until your last breath the existence of a single story. Overlap, contradiction, paradox and gaps: wave and matter, depending on what you measure with (Barad, 2007; Barad, 2014). So I told five stories, in an attempt to dislodge my own homogenous thinking, the grooves of single-track that lie beneath my conscious brain – and in doing so contribute to a collective project of displacement in order to create a future that is more just, more sustainable and more inclusive.

This is a thesis that started in hope and ended in resistance, but through these the principles – offer something, fail differently and do not tell a single story – we can begin to construct an ethical framework for worldly engagement with research and beyond.

Epilogue

'Non-scholar' to scholar, an entangled performance

"The examiners' task is to pass you if you show that you know what you are doing and to fail you if you don't"

(Evans and Gruba, 2002)

The first paper I ever submitted (Appendix 1), received a review that read: "This case is akin to a non-musician trying to play a Bach concerto. There are likely to be rough patches in the actual implementation" (Reviewer 2, pers. comm, 2010). I received this comment just as I was about to embark on my doctoral fieldwork. After some additional revision, in line with the recommendations of the other reviewer, and a letter to the editor, the paper was published (Appendix 1). It's a good example of entangled performativity: a phenomenon is what it is because of the observer(s) not despite them and not irrespective of them (Barad, 2007). 'Contribution to knowledge' is always inseparable from the eye of the beholder. It is an entanglement: of reviewer, manuscript, editor, the vagaries of scholarly trends and untold other influences. A successful performance is co-created; this is our chance, then, to co-create a complete doctoral thesis. From herein, we too are entangled – thank you for being willing to be part of our differential becoming (Barad, 2007).

The reviewer's choice of words is telling. Why 'non-'? Why not 'amateur', 'beginner' or even, to borrow one of the PhD's favoured metaphors, 'apprentice' (Laudel and Gläser, 2008)? 'Non' is stronger: the 'non' is the one attempting something for which they are neither have raw talent nor training. It is, emphatically, a signal of non-belonging. My gaze turns to you, my examiners, you are now the ones with the same power of saying whether I belong. Your statement will be performative: in writing it, it will become. This is something I should keep in mind.

Shall I perform only the movements as required, not evoke these sideshows of non-musicians and their kin? Understand, meekly perhaps, how the grooves of routine material practice do not favour me explicitly inviting your complicity in approving my 'concerto'? Extra-curricular riffs certainly seem risky – it is stepping out of line, the line to get in, the line to get over. I will keep considering this as I continue to put the introduction together (must include: introduction to the field of study, research questions, and the answers, methods and theory, outcomes; this much, at least, I have obeyed). I want to put this up front, these questions of belonging. It follows that I am hoping for acknowledgment of

transformation from 'non' into skill and competence, or, at least, appropriate training with adequate execution. The latter, after all, is more likely to be what you're looking for –a PhD, not a Nobel prize, as the now clichéd phrase has it (Mullins and Kiley, 2002). It's the essence, the core, of the task at hand. My supervisors urge caution, and suggest the conclusion, or an appendix, is more appropriate. It is risky, wherever it goes.

Now, if you are a classical musician, as you might be (I am not!), you may know that 'non-musician' is a term used by (some) classical musicians for musicians who are not classically trained. Understood in this light, the reviewer could mean someone trained in another discipline. Someone whose skills and knowledge are ill-suited to this context (using games, in workshops, with fisheries stakeholders). This would imply that with appropriate training, the rough patches would disappear. Again, we may judge the success of this thesis by the ironing out of the rough patches. We could compare the research included in Appendix 1, and described as 'non-', with the research included in papers 1-5, presented in chronological order of their writing, at least to first draft. Has enough been learned and transcribed, perchance, for me to be considered an independent scholar (classically trained)? I hope so, I hope so.

Only musicians know this terminology of the non-musician musician. If meant in this way, it was an insider comment –designed to be uninterpretable to those outside a system, and indeed its intended recipient (me, self-declared non-musician). In google scholar results, for example, non-musicians are generally control groups, for demonstrating or testing the special abilities that musicians (broadly defined) have (Kishon-Rabin *et al.*, 2001). And we must consider that classical musicians are also likely to know that Bach was encouraging and indeed insistent, that his music be accessible and acceptable to non-musicians for both playing and listening (de Feyter, pers. comm 3/2017)[14]. This brings us to the idea that the co-created success of a musician/scholar may indeed rest more in their acceptance and accessibility to non-scholars, to their ability to speak outside scholarly boundaries (in any language *but* that of expertise, in the Knowledge Cultures framework). What would it mean to read a thesis for non-scholarly success in this way? Is it relevant, for example, that the *Griffith Review* (where *Hope* was published) is a broadly read journal in Australia, that my game continues to be used for educational purposes in a professional Masters program in the Philippines, and that last month a newly minted lecturer asked if she could use it for her undergraduate natural resource management class? Can academic

14 A classically trained musician.

papers be considered as 'succeeding' in synthesising across knowledge cultures, or are they, by definition, monocultural? This thesis after all aims to "mix styles: is personal and scholarly" (Clode, 2014) in an elusive, imperfect pursuit of integration.

More questions keep arising. Why were there so many non-musicians playing Bach concertos in this project, our project, FindFishSup? Why was the least experienced programmer (me) doing all the coding? Why were all the local employees being paid USD4 an hour, when the experienced programmer (a white man, living abroad –this is contextual information, i.e. relevant), doing next to nothing, can earn USD9000, just (it seems, it is unseemly) for being an old friend of the person leading the group of people who wrote the grant? Why was I, foreign white girl with inadequate language skills, even there? How could we change all this so it was not expected or routine, but rather inconceivable? Why were these details too difficult to fit into the introduction, so many words cut, cut, cut? These are worthy questions, more important, I think, than any that got answered in my papers, as explained, but not ones I felt I had the skills, data or emotional fortitude to tackle, although I spent more than a year trying**.** I hope to return to them, one day, and perhaps with your acceptance of me as a scholar, in time I will be able to answer them with self-respecting authority.

This is a call for future research, research to change the world such that the scenario that produced the context of this research is not reproduced any more. This call applies to not only the 'academic context' in which it is possible for a (classically trained?) reviewer to consider that such incivility is acceptable, that in this context such incivility is not surprising. I also refer to the precise situation of the uneven remuneration, the patchiness of global funding that repeatedly results in exceptional Filipino scientists rerouting their activities and energy to fit in the fly-in-fly-out priorities of foreigners, and the projectified landscape where small-scale fishers accommodate an endless stream of unrelated activities which are "conspicuous" in their "failures" (Perez *et al.*, 2012) to make any material difference to their everyday lives. There is some evidence that the first point is finally receiving some attention for its local resistance: increasingly in my Facebook feed I see articles about the unfair treatment of the 'non-expat' workers of international organisations based in Manila (Arcaro, 2017), or criticising the preferential treatment of foreign scientists, even where local expertise is readily available (Rodolfo, 2017).

Continued forensic examination of where donor and philanthropic funds are spent, and research examining how to allow local entities greater autonomy and independence

from the grant-writing skills and connections of their foreign counterparts would be constructive contributions here.

And, what about the fishers? I hesitate to recommend that foreign researchers cease and desist in making Filipino fishers (and analogues) the target of their inquiries. Perhaps a 1:1 exchange of researcher to community member having an opportunity to learn another culture could be a suitable aspiration. I do also hope for a deeper and more thoughtful conversation and engagement in the incommensurate nature of the relationship between researcher and participant, with the aim that 'action research' starts to look less like as it is described in the NGO-devised 'bad girls' dictionary (vernacular English in original): "Some researchers feel guilty about stealing our wisdom decides to run a small project until they have finished their research. Then they go away with a good conscience and graduate or present their wonderful paper and our lives go back to how it was before and we never hear from them again." (Cameron and Pukmai, 2007). As researchers we must try to embody the ideals of the world we want to create: never again will I allow the boundaries of a project to dictate my interaction with a community, at home or abroad. There is solidarity in this resistance: more and more scholars are writing candidly about successes and failures in this regard, and this must surely be an important step along the way to transformation.

I feel thankful to Reviewer 2, for enabling this reading of the scholarly production process (the production of scholars, what scholars produce, what scholars should produce). For what are we here for, if not to produce a scholar? Throughout this thesis, I used the comments from reviewers as entry points into the papers as steps in the co-creation of acceptable scholarly knowledge. They demonstrate the provisionality of knowledge production and the uneven process of scholarly becoming: a dance of resistance, compromise, co-option and surrender. I have found the performance of acceptable knowledge contribution a tricky thing to execute when you insist on questioning your own and your colleagues' practice from within and not from a safe (ethnographic?) distance. The uneven privilege of being both a foreign researcher and a young, female student has made it hard to distinguish my sour grapes, blind spots, amateur writing and patchy knowledge base from institutional conservatism and entrenched bias. The former constitutes the limitations to my research, the latter the subject of future work. I over time to reduce both aspects, always with the helping hands of others, in favour of civility, inclusion, justice and sustainability.

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Appendix 1 A reflective lens: Applying critical systems thinking and visual methods to ecohealth research

RegNet Research Paper No. 2014/55

'A reflective lens: applying critical systems thinking and visual methods to ecohealth research'

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Working Paper

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Abstract

Critical systems methodology has been advocated as an effective and ethical way to engage with the uncertainty and conflicting values common to ecohealth problems. We use two contrasting case studies, coral reef management in the Philippines and national park management in Australia, to illustrate the value of critical systems approaches in exploring how people respond to environmental threats to their physical and spiritual wellbeing. In both cases, we used visual methods - participatory modelling and rich picturing, respectively. The critical systems methodology, with its emphasis on reflection, guided an appraisal of the research process. A discussion of these two case studies suggests that visual methods can be usefully applied within a critical systems framework to offer new insights into ecohealth issues across a diverse range of socio-political contexts. With this paper we hope to open up a conversation with other practitioners to expand the use of visual methods in integrated research.

Keywords

Critical systems approach, critical systems heuristics, human well-being, protected area management, visual methods, systemic intervention

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Keywords: critical systems approach, critical systems heuristics, human well-being, protected area management, visual methods, systemic intervention

Introduction

Parkes et al. (2005) pointed to the importance of transdisciplinary approaches in the field of ecohealth, citing systems-based approaches as an example. In response, this article will demonstrate that critical systems methodologies provide an effective, ethical and integrated research platform. This methodology facilitates the integration of diverse social and ecological research domains while providing a framework for reflexive research with a strong ethical base. This paper examines our application of two visual methods, computer-assisted boards games and rich pictures with a critical systems methodology. It presents our first forays into the use of visual methods to examine the culturally and economically contested terrain of shared natural resources. We use the exploratory nature of our research to open up a conversation about the merits of expanding the toolbox of approaches used for community-based or stakeholder driven research, addressing the following questions: What techniques could be used? How can they be used? In what context should they be used? And what do they bring to an inquiry that standard qualitative research approaches do not or cannot?

We use two contrasting protected area case studies, coral reef management in the Philippines and national park management in Australia, to demonstrate the value of this approach for human ecological problems in developed and developing countries alike. The first case study explores the perceptions of national park users and managers towards climate change in alpine Australia, illustrating how old conflicts become embedded in the new. The second focuses on near shore fisheries in the Philippines, where overfishing is leading to collapse in the coral reef ecosystem. The ecosystems that form the basis of these case studies, tropical coral reefs and terrestrial national parks, have been subject to similar public awareness campaigns linking human and ecosystem health - 'Healthy Parks, Healthy People' program in Australia (http://www.parkweb.vic.gov.au/1grants.cfm) and the 'Healthy Reef, Healthy People' initiative (http://www.healthyreefs.org/) based in Mesoamerica. The importance of community-based conservation approaches that aim to integrate people into conservation initiatives has grown over the last few decades. Centred in an ethic of place, community-based conservation follows the supposition that local populations, with greater interest in and knowledge of, the local context, can effectively manage resources through local institutions (Brosius et al. 1998), which learn and respond faster than centralised agencies (Folke et al. 1998). However, some commentators have identified core weaknesses with the approach citing unequal power relationships, inter and intra-community conflict, and privileging social objectives over ecological ones (see, for example, Leach et al. 1999; Kellert et al. 2000; Camargo et al. 2009). Our focus is not the extensive debate concerning the pros and cons of community-based conservation. Rather, our combination of visual methods and critical systems methodology can be utilised to understand the nexus of conflict and power over shared spaces and resources. These techniques establish creative

or virtual spaces for participants to imagine an exit out of seemingly intractable conflicts that threaten human and ecosystem health (Wyborn and Cleland 2010).
Following is a brief introduction to critical systems approaches and visual methods. We then describe the application of two critical systems methodologies and two visual methods to our Philippine and Australian case studies. Finally, we evaluate the case for expanded use of this approach in ecohealth research.
This paper focuses on insights enabled through the use of visual methods. For further details on the broader research context, findings and management implications see Wyborn (2010) and Cleland (in press).

Critical Systems Approaches

Critical systems perspectives (Ulrich 1983; Flood and Jackson 1991; Midgley 2000) accept that the real world is complex, that relationships are nonlinear and that our understanding of the world is incomplete, ill-structured and messy. Critical systems approaches help explore and make explicit contested values, power dynamics and different knowledge systems associated with a problem. Critical systems approaches encourage participants and researchers to think reflexively about their research and position in the world. They seek to empower those affected by a system of interest (Ulrich 1983), though making visible the marginalisation of alternative voices and perspectives (Midgley 2000), and exposing researchers' underlying values and motivations, particularly to research participants. As early-career researchers, we found this process to be immensely useful for evaluating our participants' experience of being part of our research as well as our own research practice.
Critical systems approaches require a commitment to (subjectively defined) improvement. They emphasize adaptive management and social learning through implementation and experimentation rather than one-off solutions. Being 'critical' includes evaluating both the collective effect of individual people's differing internal construction of 'what is' (via their assumptions, values and beliefs) and the structural effects of hierarchies, institutions and tradition. The critical eye also turns on the researchers themselves, through exposure and analysis of values that underpin research design and outputs (Ulrich 2003, p326).
This paper draws on two streams of critical systems methodologies: Werner Ulrich's *Critical Systems Heuristics* (1983) (Kosciusko National Park) and Gerald Midgley's *Systemic Intervention* (2000) (the Philippines). These methodologies guided a reflexive process of inquiry and created a series of steps to engage with actors in our two case studies. Moreover, the marriage of critical systems thinking with visual research methods fits with Jackson's concept of critical systems practice, whereby different techniques and approaches are applied as appropriate to the specific system of inquiry (Jackson 2000, p17).
In accordance with the methodological commitment to uncovering the values and assumptions of researchers, we declare our normative stance to be that conflict over human use and management of protected areas can jeopardise their role as important landscapes for ecosystem function, and human physical and spiritual health. Therefore, our research not only aimed to uncover how humans relate and interact with protected areas, but also to encourage our participants to reflect on these relationships in terms of their personal life views and experience. In doing so, we hoped to contribute, albeit in a small way, to generating better support and understanding of the role of protected areas in supporting human ecosystems.

Visual Methods

Visual methods is a multidisciplinary field of social science experiencing a revival in recent years (Wagner 2001). It encompasses a wide range of field-based methods where images and other 'visible' artefacts are used or created by participants in a (research) intervention (Prosser 1998). Common methods include ethnographic film, photo elicitation, community art, drawing, and respondent photography projects, amongst others.[1]
In response to the "global surge" in interest in (and use of) visual methods described by Prosser and Loxley (2008, p1) we seek to explore how visual methods can be used within a critical systems framework to address ecohealth problems. Whilst these authors link the growing uptake of visual methods to the "urgent, challenging and complex" (p2) problems of our time, surprisingly few studies apply visual methods to environmental concerns (one example is Gloor and Meier 2000).

[1]A useful plain English introductory guide to research methods by Prosser and Lockley (2008) is available from the UK's National Centre for Research Methods, http://eprints.ncrm.ac.uk/420/1/MethodsReviewPaperNCRM-010.pdf (date accessed May 26, 2010

In contrast, in the health domain the literature applying visual methods is growing (see, for example, Cross et al. 2006; Prosser 2007; Irving 2010 and the discussion in Guillemin (2004)). Following the broader claims within the visual methods field of offering unique insights (e.g. Prosser 1998; Mair and Kierans 2007), these studies have pointed to the ability of visual methods to uncover a range of new understandings about the relationships between self-identity, disease and health. These authors tend to echo Guillemin's (2004) criticism that traditional word-based qualitative techniques such as interviews and focus groups "limit the extent to which, as researchers, we can explore the multiple ways in which illness is understood and enacted" (p273). Note, however, that the majority of these studies continue to use traditional methods as their primary data source, pointing to the likely complementarily of visual methods to standard data collection procedures. For example, in a study mainly comprising interviews with patients with spinal cord injuries, Cross and colleagues (2006) found that drawings done by interviewees, along with spoken explanations of those drawings, revealed hidden aspects of the participants' acceptance of their disability and the image they believe they are projecting to the world. This reframed understanding of self and society had important implications for disability support and rehabilitation services and policy, particularly for longer-term psychological care.

Applying these methods to the broader ecohealth field will mean scaling up the site of inquiry from the body, its pathogens and vulnerabilities to the community, and its relationships with the outside world. This is what we have attempted to do in the following two case studies: by asking participants to engage with an imaginary world, through a board game or through drawing, we hoped to gain access to representations of knowledge that would not otherwise be accessible, as predicted by Packard (2008). The next two sections will briefly introduce our case studies and methods, and then canvass the strengths and weaknesses of our approach.

Critical Systems Heuristics, Rich Pictures and Kosciusko National Park

Wyborn's work in the Kosciusko National Park used Ulrich's *Critical Systems Heuristics* (CSH) to frame the inquiry process and interrogate a longstanding conflict. At the heart of this conflict is the balance between conservation imperatives and human use in national parks, a complex problem in protected areas across the world. Indeed, managers are still confronting conflicts from when the park was created fifty years ago. Kosciuszko National Park (KNP), located in the alpine area of southern New South Wales, has immense biological and geomorphologic significance, and is internationally recognised for its natural, scientific, cultural and recreational value (Good 1992; ISC 2004). However, the history of the Australian alpine area, which has been identified as having three distinct phases, Aboriginal pre-European, European exploiter and European conserver (Lennon 1999), is also marred by conflict between the persistent values that dominated in these eras.

After a protracted dispute between competing interests, a reserve system was created in 1967. This led to the cessation of grazing in the high country and created perceived winners (the conservation groups) and losers (the graziers) in the community. This dispute has now morphed into a conflict over cultural and natural heritage. In essence, it is a conflict of instrumental values, as the interested parties value different aspects of the park in different ways (see Wyborn 2009 for further detail). These issues are further complicated by the now year round, billion dollar tourism and ski resort industry in the park, which provides a substantial contribution to both the park's income (through park visitation fees) and the regional economy. Moreover, it is now accepted that climate change threatens both the ski industry and biodiversity. As climate change stresses an already fragile environment, changes in the biophysical world are likely to exacerbate longstanding tensions in the social sphere. In this context, the explicit focus of critical systems approach on contested values and social-ecological interactions was used to engage with and untangle the complex power relations among the various actors in Kosciusko National Park.

CSH is a discursive framework for promoting critical (reflexive and emancipatory) research practice (Ulrich 1983). The core of CSH involves the use of 12 heuristic questions to interrogate a system and to assist the process of drawing and setting boundaries around a research process (boundary critique). As originally articulated, Ulrich's questions use 'Is' and 'Ought' modes to assess the normative content of a system or its design. The intention of the two modes of questioning is to create a space where researchers (and participants) can articulate their idea of 'improvement' in a situation. However, following Midgley's critique of the inaccessible jargon of the questions (Midgley 2000, p140 (in footnote)), Ulrich's schema was adapted into plain English for the purposes of this research (Table 1).

Table 1 Ulrich's Twelve Questions as Relevant to Kosciusko National Park (KNP)

1.	Who is (ought to be) KNP intended for?

2.	What is (ought to be) the purpose of KNP?
3.	What does (ought to) demonstrate that KNP and the NPWS is fulfilling this purpose? What is the mechanism in place to ensure this happens?
4.	Who is (ought to be) the decision maker?
5.	What components (resources and constraints) are (ought to be) controlled by the decision maker?
6.	What is (ought to be) out of the control of the decision maker?
7.	Who is (ought to be) involved in planning the management of KNP?
8.	What skills are (ought to be) required to manage KNP?
9.	Who or what is (ought to be) the guarantee that the National Parks and Wildlife Service (NPWS) will carry out KNP's purpose and goals?
10.	Who is (ought to be) considered to be affected by KNP and the Plan of Management (POM)?
11.	Are they given the opportunity to voice their position? Is it (ought to be) considered by the National Parks and Wildlife Service and the POM?
12.	What worldview actually underlies (ought to underlie) the design of KNP? Is it shared by the involved or affected?

The 12 heuristic questions were central to the research process. Firstly, they were used to establish initial conceptualisations of the research problem and questions. Secondly, they were used to as a platform to guide the interview protocol. Thirdly, they were utilised as a heuristic to assist data analysis, which was guided by an iterative examination of the differences between respondents ideas of what 'is' and what 'ought to be' in the management of KNP. Through this process, the questions created an analytical space where Wyborn was able to identify areas of desired improvement in the system. Continually referencing the twelve questions stimulated iterative process of reflection on the values and assumptions embedded in the research process.

Rich pictures

In the KNP case study, a picture drawing exercise, inspired by Peter Checkland's rich picturing approach was adapted to be used as an interview tool. Introduced in Checkland's *Soft Systems Methodology* (1981), a rich picture represents an individual's understanding of a complex issue or problem situation through depicting the associated issues, actors, problems, processes, relationships, conflicts and motivations. Checkland (1981) argued that rich pictures demonstrate the detail of values, behaviours and abstract concepts that linear prose is unable to capture. Jackson (2000) suggests that rich pictures were the most successfully and commonly implemented aspect of Checkland's approach. While the original intent was for researchers to use rich pictures to creatively and artistically brainstorm their work as it progressed (Monk and Howard 1998), Wyborn used rich pictures to provide participants with a space where they could creatively engage with the interview process and their own relationship with the national park.

Interviewees reflected the variety of people who have an interest in KNP: park managers; government scientists; recreational users; and commercial operators. Upon starting a one-hour semi-structured interview, participants drew a rich picture series of their perception of the park now (2007), in 2020 and in 2070. The concept of a rich picture was explained to the participants, with an emphasis placed on the intention to capture key actors and their relationships, processes and influences at play in the area and their relationship with the region. Participants were then asked to tell the story of their picture, enabling them to direct the conversation where they wanted, without being influenced by the researchers' values and agenda that are embodied in interview questions (see Fontana and Frey 2005). This approach is consistent with a critical systems methodology ethos, whereby the researcher remains cognisant of how their research agenda shapes their interactions with participants.

The exercise focused participants on the topic material of the interview and their relationship with KNP. In particular, having to depict change over time made participants reflect on the consequences of biophysical change on their interaction with the national park. The process established a rapport between interviewer and participants through creative engagement and story telling. The use of rich pictures as an effective catalyst for conversation is consistent with Checkland's claim that they are an "invaluable… starting point for exploratory discussion" (Checkland 2000, p22) At the end of the interview the participants were asked to share their thoughts and opinions on rich picturing. Seventeen of the eighteen interview participants were supportive, describing the technique as "innovative", "interesting", "enjoyable" and "thought-provoking". The sole participant who was not supportive questioned the purpose and did not see how it could contribute to the research.

An additional mechanism to evaluate the pictures arose unexpectedly in the research through a discussion group held with a regional advisory committee to triangulate findings from the interviews. The group discussed their perceptions of climate change and management in KNP, but did not undertake the rich picturing exercise. Without the pictures it was difficult to focus discussion on KNP as the conversation frequently drifted into broader debates about climate change and further. This demonstrated the value of having the pictures to restrict discussion to KNP only.
The rich pictures far surpassed initial expectations as both an interview tool and a data set. By asking participants to imagine their future in a changed landscape, the rich picture exercise encouraged participants to confront the reality of climate change in a place they treasure. For example, in figure one, the person fishing is absent from 2070 scene and the smile on the contemporary image has shifted to a frown in 2050.
INSERT FIGURE 1 HERE

Figure 1 Rich picture drawn by recreational user of KNP

Many people become embedded within landscapes they experience on a daily basis, making it easy to mentally detach from change processes occurring. An important outcome of the KNP study was an insight into the complex and paradoxical perceptions that individuals and communities hold about national parks. Perceptions of a national park are deeply personal and often formulated through strongly held attachments to place. These attachments were often contradicted by an individual's interpretation of the legislation that shapes management of the park (Wyborn 2009). For example, the pictures and the conversation they invoked would depict a personal relationship with that space, the individual skiing, mountain biking or an aspect of their memories in that place. However, when they discussed the legislated purpose of the park, the experience of the individual was removed, and the park became an abstract place set aside for conservation or cultural heritage. The image in figure two was drawn by a commercial operator who, despite his desire to maintain his relationship with the park in a manner of his choice believed that a park should be for the conservation of the environment an element which was absent from his image. This finding was uncovered through the iterative process of reflection stimulated by the critical systems approach. Moreover, this illustrates our claim that the playful space created by the visual method provided a window of insight into the complex and deeply personal relationship at the core of one's sense of place.
INSERT FIGURE 2 HERE

Figure 2: Rich picture drawn by commercial operator in KNP

Upon reflection, bringing the research participants together to share the images and stories surrounding the pictures would have strengthened the rich picturing exercise. While this was beyond the scope of the research, the tool can effectively be used in participatory workshops to engage participants in a broader conversation about shared values and shared experiences in a place. The primary conflict in this region concerns the balance of competing interests in a finite space. Bringing people together to reflect on and engage with this conflict in a non-threatening and creative manner may go some way towards illustrating the common ground – a shared sense of place – in competing interest groups. As it was, only the researcher was able to gain this insight into the degree of commonality held by these groups and there was no opportunity for dialogue and collective (re)imagining of the future. This limitation speaks more broadly to interview-based research that does not actively engage participants throughout the research process.

Systemic intervention using board games in the Philippines

Our second case study used Midgleys's (2000) *Systemic Intervention* as the guiding research methodology to explore possible exit routes for fishers of seriously depleted coral reefs in the Philippines, using a participatory games approach. Sharing many of the values of CSH, Systemic Intervention frames all research as an 'intervention' into a given socio-ecological system. Midgley urges researchers and other change agents to critically reflect on the boundaries they create around their intervention or research, as they relate to power, values and institutional structures (Midgley 2000).
To explore the roles, relationships and attitudes of local fishers towards conservation and livelihoods, Cleland et al. (in press) created a computer assisted board and role-play game "ReefGame". In short, ReefGame is a fishing game played on a gridded board made up of land and sea squares. Fishers can choose to go fishing or choose other livelihoods, and an accompanying computer model calculates their catch, income and expenses, and the expansion of algae at the expense of the corals. In addition, fishers are asked to implement marine management measures in response to falling

catches and damaged corals. Approximately 20 resource-poor fishers from Bolinao in the Lingayen Gulf area of the northern Philippines played ReefGame in a day-long workshop in September 2007 (see Cleland et al. (in press) for a complete description of the game and workshop). Figures 3 and 4 show the ReefGame board and participants playing the game.
INSERT FIGURE 3 HERE

Figure 3 ReefGame board
INSERT FIGURE 4 HERE

Figure 4 Workshop participants playing ReefGame

For this case study the utility of a critical systems approach was twofold. First, it offered a framework to engage with issues around oppression and inequality. This was especially important given the enormous power disparities between government managers, academic researchers and the poverty-stricken fishers. Second, the emphasis on reflective research practice focussed the interrogation on the utility and ethical validity of using complex, technical tools in an underdeveloped community as part of research activities.
Following Midgley, careful consideration was given to boundary critique – who would be involved in our research intervention, how and why? Data from interviews, and personal experience with fishers, confirmed that many fishers are shy in groups and unfamiliar situations, particularly when people with political or economic power are present. This informed two major design decisions. First, we only invited fishers to the one-day workshop. Government representatives (village and municipal resource management officials) were invited to attend an afternoon debriefing session, where fishers would have a chance to speak about their experiences and make recommendations. Our intention was to enable participants to build rapport and confidence in the group before attempting to engage with policy-makers.
Second, fishers in Bolinao have been subject to many decades of donor-funded initiatives implemented by different aid agencies. Invariably, these projects include ‘stakeholder workshops’ similar to the one we planned. Non-government workers consulted in the design phase were deeply cynical of the achievements of such activities. Several explicitly warned against “promising more than we could deliver”, citing growing community discontent with processes that were not transparent about their capacity to achieve change. Furthermore, the precarious situation of the fishers meant that project partners were wary of sending pessimistic messages, seeing this as counterproductive and disempowering – as one said “it’s important that they see hope in all this”. For these reasons, ReefGame was designed to be highly visual, tactile, and fun, using colourful game boards, tokens and cards (Wyborn and Cleland 2010). Similarly, the game did not impose the educational or economic barriers to entering alternative livelihoods that fishers would experience in real life, instead opting to explore fisher aspirations and preferences. Finally, ReefGame was intentionally designed as a two-way social learning tool. In this way, whilst the primary aim was as a social research activity, through the game interactions fishers would also have the opportunity to create knowledge and build relationships with their peers.
Participants responded to ReefGame as if it were a snapshot of reality, relating their game behaviour to their everyday lives, motivations and knowledge of their local environment. For example, their fishing ground choices were overwhelmingly based on local ecological knowledge (e.g., deeper reef has bigger fish), as well as resource constraints that had not been specified as part of game rules (e.g., when fishers did not have a motorboat, they would stay close to the shore). Together, these examples provide strong evidence that participants had accepted the game as a viable metaphor for their local space and everyday actions. This has two implications for ReefGame’s validity as a research and learning tool. First, participants were able to relate what they learned back to their lives. Second, it demonstrates that players’ behaviour and attitudes can be taken as realistic, and not merely induced by the gaming environment.
Several participants commented on how they had learned through the game that catches would continue to fall, and corals die, even if each fisher was not extracting large quantities of fish, simply because there were too many fishers. Other participants questioned this, wondering why the coral would be dying if there was no illegal fishing.[2] These participants perceived fishing as a stable income-source, reflecting a (erroneous) belief that as long as legal methods are used, fishing will not devastate fish stocks. Indeed, fishers did not shift from fishing, even when new livelihoods were offered, characterising these as ‘risky’. This was a revelation for researchers, who assumed that

[2] This refers to MPA encroachment and cyanide/blast fishing, which are the most common types of illegal fishing in the region. This information was gained from local government officials consulted in the design phase.

fishers were not leaving the fishery despite very low catches and income because of education or opportunity barriers (Cleland et al. in press).

Connecting fisher perceptions with the reality of fish stocks is vital for future reef management. Not all participants were able to acknowledge the links between population and catch. However, those who did also began reflecting on the choices available to them to secure a better future and avoid becoming passive casualties of government-led fishing restrictions, or, eventually, ecological collapse. It is counterproductive to blame the municipal fishers for the woeful fisheries situation. Given their extreme poverty and marginalised social position, they are poorly placed to single-handedly change their social-environment relationships. However, if fishers recognise that they, too, are part of the solution, governance interventions such as livelihood programs and fisheries access/equipment regulation may be easier to implement.

The game provided a valuable platform for collective learning. One example involved an incident with two elderly (70+) men from one of the villages most actively opposed to creating protected areas. During the game, these men announced that they now understood the rationale behind protected areas and were planning to go back to their community and campaign in support of establishing one in their inshore waters. Similarly, during the final debriefing the two chosen fisher spokespeople announced, without prompting, that they would share the lessons from the workshop concerning marine conservation and livelihood options with their communities. By appointing themselves as message-bearers, the fishers demonstrated that they felt ownership over their new knowledge. Rather than being handed expert knowledge, experiential learning through the game gave participants a self-derived mandate, in a way that lecture-based learning would be unlikely to achieve.

The approach also had deficiencies. The attempt to include decision-makers was unsuccessful, as four out of the five invited government officials did not attend. This demonstrates problems with the original attempt to set boundaries around the research exercise (Midgley 2000). As one facilitator commented “Our expectations regarding the ‘automatic’ engagement of officials with the fishers were too ambitious.” Fishers noticed and lamented the lack of links to management, recognising that we had lost the chance to take a novel approach further. As one facilitator commented, the participants were hoping that it would be more than “just a game”. In addition, creating and facilitating ReefGame was resource-intensive, not only because of the need to design, buy and print game materials. Four facilitators worked together to co-ordinate game-play, computer-operation and debriefing sessions – considerably more than would usually be needed for a twenty person workshop. Similarly, the spontaneous interactions and the tendency for more than one fisher to speak at once made the sessions lively, but also much more difficult to record and analyse.

Some of these problems were a direct result of the structural limitations of the project. It was set up as a pilot experiment as part of a global effort to design modelling and decision support tools to build capacity in coral reef management (see www.gefcoral.org for details). Because of this, the aims were to test the potential of the approach to contribute to social learning through a two-way interaction between local stakeholders and researchers, rather than to contribute to a specific policy outcome or participatory decision-making process.

Given the structural limitations of the project design, securing the enthusiastic participation of the fishers overrode the two weaknesses outlined above. Filipino facilitators commented on the enthusiastic response of the participants to the game, comparing this to their experiences with more traditional research scenarios, such as interview and focus groups, where the primary goal of ‘information extraction’ created awkward one-way interrogations (Wyborn and Cleland 2010). In comparison, pre-workshop interview questions designed to elicit information about fishers’ aspirations for the future tended to produce monosyllabic and vague responses. This points to the probable utility of games and similar visual approaches where stakeholder fatigue or social inhibitions are likely to be a factor amongst participants (Wyborn and Cleland 2010).

Lessons for Practice

With a focus on learning and reflection, critical systems approaches provide one possible framework for interrogating the wicked problems of the ecohealth field. As they stand, these approaches provide a useful framework to access the multilayered complexity associated with natural resource management, and to facilitate an understanding of the interactions between social and biophysical systems. However, our endorsement of these approaches comes with qualifications.

The literature and methodologies within this broad umbrella have been criticised as being abstract (Brooke 2002). While it could be argued that that complex problems require complex lenses to be understood, overly convoluted social research methodologies are unlikely to be rapidly absorbed by community groups, practitioners and resource management agencies. Although Ulrich’s CSH claims to bridge the divide between expert and practitioner (Ulrich 2003; see also Brooke 2002), we believe

that more work can be done to make these approaches more readily accessible to management agencies and practitioners, who are usually operating under severe time constraints and can be sceptical about the value of social science in helping them carry out their tasks. In the interim it is perhaps more important to promote the core values of critical systems – reflection and engagement with power relationships – than endorse any one approach (Brooke 2002).

A continuing challenge for protected area research is the tension between research on and advocacy for protected areas. This tension is particularly evident where there is ongoing conflict about who should be allowed to use these areas and for what purpose. In this space, the external expert dispensing their advice and pushing their agenda is an all too familiar occurrence in protected area research in both developed and developing countries alike. Through the use of creative, enjoyable and interactive research methods we were attempting to subvert the traditional valorisation of the researcher (KNP) and offer a two-way learning opportunity for our participants (Philippines). There is, however, an unavoidably normative dimension to our research. This is where the critical systems approach comes into play. With its focus on critically examining the normative claims that underpin research, its design and the outputs that it generates, critical approaches can help tackle ecohealth research problems in a thoughtful, reflective and productive way.

Given the overwhelming impact of human activity on environmental degradation and resource-based conflicts, social and creative research tools offer an important resource for understanding and reflecting on patterns of behaviour. Visual methods or critical methodologies are not the only way to tackle complex issues and wicked problems. Moreover, we openly acknowledge that research alone will not resolve either of the conflicts discussed here. There are many ways to interrogate conflict, power imbalances and the research process itself; and no one single method of engaging with research participants will offer a complete picture of their views and perceptions. All methods can only ever access and interpret a fraction of the motivations and narratives that shape an individual's relationship with the world around them. The findings discussed in this paper are promising. We suggest that the use of visual methods in our research illuminated a different aspect of this life world than would have been possible with standard social research methods (Wyborn and Cleland 2010).

Ecohealth researchers are often asked to 'think outside the square' of traditional research domains or to use new approaches and methods, such as those presented here. In these cases, where innovative or participatory methods are being piloted we suggest that a methodology which promotes iterative, critical reflection on research assumptions and implementation is necessary. The critical systems framework employed in these two case studies illuminated new perspectives on longstanding, seemingly intractable issues. We hope that the understanding gained can stimulate innovative research or management for the future, to continue an iterative process of reflection and learning that will lead to improvement.

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Appendix 2 Simulating the dynamics of subsistence fishing communities REEFGAME as a learning and data-gathering computer-assisted role-play game

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Simulating the Dynamics of Subsistence Fishing Communities: REEFGAME as a Learning and Data-Gathering Computer-Assisted Role-Play Game

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Abstract

REEFGAME is a computer-assisted role-playing game that explores the interactions among management strategies, livelihood options, and ecological degradation in subsistence fishing communities. The tool has been successfully used in the Philippines and a variety of student workshops. In the field, REEFGAME operated as a two-way learning tool, helping local fishers understand better their collective impacts on the marine ecosystem and providing researchers with insights into fisher livelihood strategies. This demonstrates the game's ability to serve as powerful springboard for social learning and discussion among stakeholders, while providing useful scientific insights into decision-making processes. Although not specifically designed for the purpose, REEFGAME has also been used in the university setting to facilitate student engagement and demonstrate a range of social and ecological concepts.

Keywords

agent-based modeling, alternative livelihoods, artisanal fisheries, board games, cash economy, commons, computer-assisted simulation, coral reefs, debriefing, debt

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relationships, decision-making processes, decision-support tools, ecology, ecosystem-based management tools, fish catch, fish population dynamics, fisheries, game board, gaming behavior, income, information distribution, integrated coastal zone management, livelihoods, mangrove, marine ecosystems, model, natural resource management, overfishing, poverty, Philippines, "real-life" conditions, REEFGAME, role-playing games, sea grass, simulation, social learning, socioecological interactions, stakeholder discussion, subsistence fisheries, sustainable development, time distortion

Across the globe, overfishing is an increasing problem (Pauly et al., 2002). The collapse of target species has a disproportionate effect on subsistence fishers as they often lack the skills and economic infrastructure that would aid a successful transition to alternative livelihoods, known as the poverty trap (Cinner, Daw, & McClanahan, 2009). In the Philippines, widespread degradation of the coral ecosystems that support the coastal fisheries has resulted in significant declines in catches, particularly in the Lingayen Gulf area in the north of Luzon (Licuanan, Aliño, Campos, Castillo, & Juinio-Meñez, 2006; McManus, Nañola, Reyes, & Kesner, 1992). Aid programs designed to encourage fishers into alternative livelihoods have had very little success to date (Sievanen, Crawford, Pollnac, & Lowe, 2005), and the fisher population continues to grow (Cruz-Trinidad, Geronimo, & Aliño, 2009).

Following Meadows (2001) and Barreteau, Page, and Perez (2007), we are aiming to contribute—through computer-assisted role-playing games—to finding socially and ecologically sustainable "ways out" for artisanal fishers in depleted fisheries. In general, marine ecosystems have been somewhat neglected by this approach, evidenced by the fact that the Natural Resource Management symposium of *Simulation & Gaming* in 2007 only included one article that had a (partial) focus on fishers and fisheries (Barreteau et al., 2007). Likewise, other "fishing" games have tended to focus on commercial fishery dynamics (e.g., Meadows, 1999; Qudrat-Ullah, 2007).

To meet this need, we created REEFGAME (2007), a computer-assisted role-playing simulation/game (see Crookall, Martin, Saunders, & Coote, 1986; Thavikulwat, 2009). Through the game, we sought to

1. create an interactive and dynamic tool for fishers to better understand their collective impact on the marine ecosystem
2. investigate fisher livelihood strategies and conservation attitudes in the face of declining catches and increased competition (Cleland, 2007)

The design of the game and its companion simulation model incorporates these two aspects through successive scenarios of increasing complexity, intersected with debriefing periods. This pseudo-experimental setup tries to overcome some limitations attributed to traditional designs in experimental psychology or economics by releasing unrealistic constraints imposed on participants like controlled communication or obedience to preestablished rules (Janssen & Heuberger, 1995). The game was parameterized for the Western Lingayen Gulf region in the Philippines.

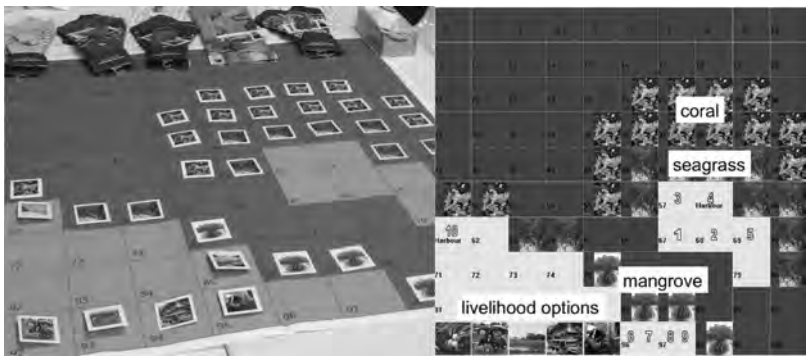

Figure 1. (Left) Actual game board with green patches of land cells and blue patches of sea cells. (Right) Corresponding grid on the agent-based model
Note: Numbers from 1 to 10 (large font size) are players' initial locations.

Although we did not explicitly design REEFGAME for students, it has subsequently been used in a number of undergraduate and postgraduate research workshops. This is described in more detail toward the end of the article.

REEFGAME: An Overview

Game Description

REEFGAME is designed for 10 to 30 people. Ten player pairs take on the role of fisher and head of family. Extra players can be bankers and/or scribes. Each fisher pair is given a coastal cell as their "port" and has a unique fisher token and profile. The profile includes the following:

- number of children (random between two and four)
- family expenses per round (in Filipino pesos [P$] and based on family size)
- boat type (motorized or not)
- transport costs per cell (double for motorized compared with nonmotorized)

Because each fisher has different assets (type of boat) and family sizes, ingrained social differentiation occurs between groups. This mimics the real situation of fishers and can also help spur discussion about inequality and justice when REEFGAME is played with students.

The game board represents an abstract coastal area including a nearby island, featured on a 10 × 10 grid made up of sea and land cells (Figure 1). Selected sea cells have habitat cards, showing the location of mangrove, sea grass, and corals. Particular land cells have livelihood cards, one for each of the different income-generating activities available.

Participants are split into two groups playing around two identical boards (five groups per board). Communication within a group is encouraged but discussions between groups are made difficult through room arrangements (e.g., having the boards in opposite corners of the room). The aim is to introduce asymmetry of information between groups and limit the extent of unrealistic collaborative strategies. When participants are playing on two different boards, they are actually interacting over the same physical space. It is the role of the computer model to collect and process information coming from both groups. At the end of each round, the model calculates remaining fish stocks and individual economic outcomes resulting from cumulative effects of decisions taken by the 10 pairs of players. Algorithms used to simulate socioecological interactions (see the appendix) are oversimplistic but tend to reproduce the trends observed by Trinidad and colleagues (2009) **[AQ: 1]**in the region over the past 20 years.

Each fisher group aims to earn enough to meet their family's expenses, through fishing and other livelihood activities. To reach their goal, each pair of players decides at the beginning of each round either to go fishing (by moving their token to any sea cell) or to work for a wage among the different alternative livelihoods proposed (located on specific land cells). At the end of each round, the computer model calculates individual catches and incomes.

- First, players receive their fish tokens representing their catch. Fish are divided into two types: higher value "big" fish (codfish icon) and lower value "small" fish (parrot or rabbit fish icon). Each type of fish has a fixed value (see the appendix).
- Then, fish tokens are swapped for poker chips, which are used to track each pair's cumulative income or debt. Players receive their gross earnings.
- The banker then collects the family expenses from each player. The banker can be played by one of the player groups, or an independent player, depending on numbers. Figure 2 shows a schematic representation of the game sequence.

When fish stocks on a healthy coral cell drop below a threshold, the coral dies and is covered by micro-algae. The coral habitat card is swapped for an "algae" card (depicting dead coral, covered with micro-algae) on the game board as a visual signal of reef degradation. This mechanism prompts discussion about the links between fishing activities and coral reef health. The computer model calculates fish population dynamics resulting from players' activities. While each round of the game corresponds approximately to daily catches and levels of income, each simulation step translates the corresponding level of fishing pressure into much longer term ecological impacts. This time distortion allows better gaming dynamics as the situation degrades rapidly with overfishing. Despite the obvious risk that this "simulation trick" may alienate participants, our experience shows that players tend to accept the time contraction as long as their daily activities are correctly described.

Having physical money tokens allow players to form debt relationships, as they can exchange or steal each others' chips or, alternatively, form partnerships as when opportunities for investment arises (e.g., in a fish cage). In the Philippines, debt relationships

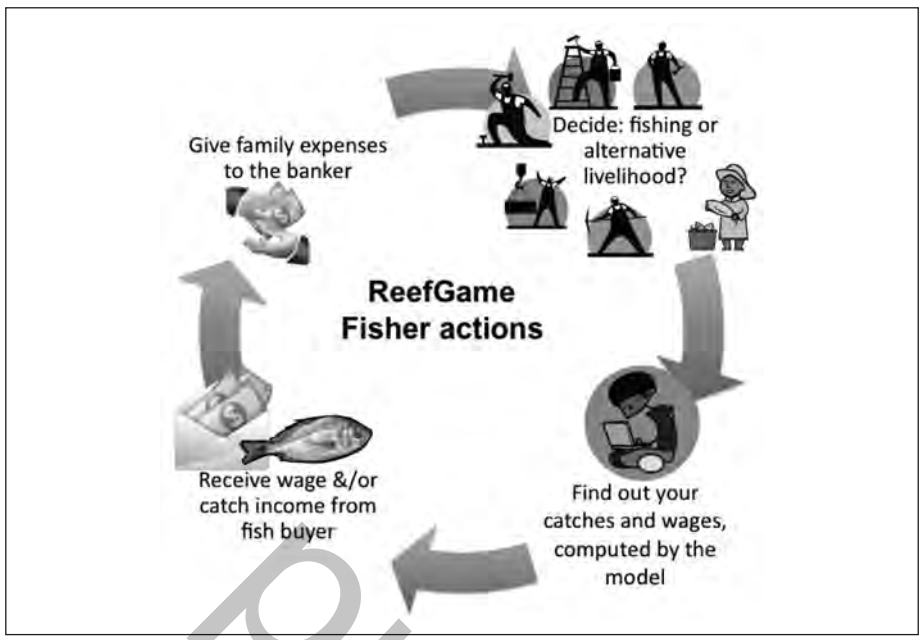

Figure 2. Game sequence

are very common, particularly among fishers and fishmongers (Pomeroy, 1992). However, as part of the informal cash economy and because it can be a source of shame or embarrassment, relatively little is known about how credit provision affects corruption, economic resilience, and persistence in the fishery. Implicitly recreating these relationships through the game encourages discussion about their impact in fisher society. When using the game in a classroom situation, the introduction (or not) of poker chip exchanges outside the articulated game rules can introduce discussions about characteristics of commons management, such as free riders, rule breakers, and the impact of power dynamics.

Storyboard

Flow of the game is divided into four successive phases each designed to elicit a different aspect of livelihood strategies displayed by fishers (see Table 1).

The importance and utility of REEFGAME lies in its interactive capacity. The ecological and economic dynamics themselves are not currently sufficiently original or robust to justify running the model as a simulation only, except to test that results are logical and defensible. Here, "logical" corresponds to outcomes that reflect our qualitative understanding of coral reef ecosystem dynamics. For example, where coral reefs are overfished, coral cover tends to decrease and algal populations increase (White, Vogt, & Arin, 2000). Similarly, when habitat degrades, fish populations and catches tend to decline (Mumby et al. 2004; Nystrom, Folke, & Moberg, 2000). "Defensible" refers to our ability to defend

Table 1. Flow of REEFGAME Phases, Activities, and Decisions

Phase and Round	Activities and Decisions
a. Fishing only, Rounds 1-4	• Participants can only choose sea cells as a destination. • Initial rounds aim to familiarize the players with the game and allow them to see changes in volumes and composition of catches. • They begin to develop theories about the ecological dynamics embedded in the model (i.e., why and how fish catches are changing as a function of distance from the coast, proximity to coral reefs, and fishing effort expended) and meld these with their own physical experience.
b. Alternative livelihoods, Rounds 5-7	• Participants can decide either to continue fishing or to explore alternative livelihoods. (According to a socioeconomic survey conducted by the Modelling & Decision Support Working Group in 2006, available options are: fish pen caretaker, construction worker, ferry crew, taxi/tricycle driver, unskilled tourism worker, and mango or rice farm worker.) • They can also invest in an outboard motor to improve their fishing capacity or buy a fish pen to develop an aquaculture business. • Finally, players are offered the opportunity to migrate permanently to a major city.
c. Household strategy, Rounds 8-11	• Each pair is given an extra token and asked to determine the activities for another breadwinner in the household. • This allows participants to diversify their strategies. This resembles better the livelihood patterns identified in studies of resource-poor fishers, which tend to manifest at the household level (D'Agnes, Castro, D'Agnes, & Montebon, 2005; Eder, 2005). • Adding 10 extra actors also mimics population increase, adding further stress on fish stocks.
d. Marine Protected Area, Round 12	• One group (i.e., one board) is asked if they want to implement a marine protected area. If so, players have to agree on its location, size, and management rules (i.e., the chance for poachers of getting caught and corresponding penalties). • The other group is not involved in the decision, only informed of the consequences. This situation mimics how considerable sections of the community are excluded from conservation decisions, particularly when they lack connections to local power brokers or conservation bodies (Gollin & Kho, 2002; Rivera-Guieb, Graham, Marschke, & Newkirk, 2004). • The scenario explores participant attitudes toward conservation measures that restrict fishing activities.

and justify our dynamics against questions and challenges from REEFGAME participants. For this reason, the range of possible fish catches was set within historical and current limits for the Western Lingayen Gulf region. However, this can be easily adjusted according

to the different aims of particular workshops in order to stimulate discussion among participants, as discussed further below. Fishing dynamics are tested by a stand-alone model, which substitutes the fishers' autonomous movements on the game board/interface with a random walk method (on sea cells only).

Progressive Debriefing

Several levels of debriefing sessions are held throughout REEFGAME. The aim is to create a structured opportunity for participants to reflect on and share their experience within the game setting, connect this with their real-life context, and derive new knowledge and understanding from these comparisons (Stewart, 1992). Unlike standard debriefing activities, which take place only after "the game is over" (Lederman, 1992), progressive debriefing allows both facilitators and participants a chance to "digest" or "process" what is happening in the game at various stages. This tends to reduce the chance of recasting, forgetting, or ignoring initial impressions in evaluating the lessons and worth of the activity. This is particularly important with REEFGAME, as it is played over a number of hours.

Group round tables are held between each round so participants can discuss and justify their decision-making processes. In addition, before changing scenarios, the facilitator asks the group to reflect on the following:

1. the strategies they developed and why these were/were not successful
2. the changes in the marine environment

A final debriefing stage is dedicated to collectively analyzing and evaluating the activity, sharing group and individual learning, and discussing the potential for real-life application of the lessons learnt.

In the final stage, facilitators ask the participants the following questions:

- Did you enjoy the workshop and why?
- What did you learn?
- What can be applied in real life?
- What would you have done differently?
- What recommendations would you make to government representatives?

Each group then nominates a representative who reports back to the group as a whole.

REEFGAME in the Field: Gaming to Learn

The Experiment

In September 2007, REEFGAME was played at a 1-day participatory workshop in Bolinao, Lingayen Gulf, Luzon Island, the Philippines. Twenty local fishers, 13 men and seven women, attended the workshop organized at the field research station of the

Marine Science Institute. As sustainable fishing futures in the Lingayen Gulf will require both reducing fishing pressure and increasing fish biomass, we aimed to answer two central research questions through this workshop:

1. How do fishers frame and understand their livelihood options?
2. How can conservation initiatives be effectively introduced and enforced?

Procedural Analysis

It is important to be able to relate individual decisions made by players to their observed consequences and then analyze the influence of the latter on the next round of decisions. To do so, the computer model records all the moves, catches, and incomes of every fisher in the game. At the end of each gaming phase, a debriefing session gives the opportunity to each pair of players to justify their behavioral choices and strategic changes.

Importantly, throughout the game, the players referred to "real-life" conditions, such as weather, seasonality, local habitat niches, and distance from markets, to justify their fishing and livelihood choices, rather than the inbuilt gaming parameters. Therefore, while we cannot claim that the fishers' gaming behavior mirrored exactly what they would have chosen to do in everyday situations, we do know that "real life" was the frame through which their decisions were made. In similar fashion to other data-gathering techniques, such as interviews, gaming observation offers a fascinating glimpse (albeit imperfect) of an individual's rationality and interactions with the world around them. To evaluate the validity the game evidence gathered, we must relate it to what we know about the particular socioeconomic context in which the game is played (see, among others, Peters, Vissers, & Gerton, 1998).

In the Bolinao workshop, the economic and ecological situation severely degraded after 11 rounds. Table 2 shows that the average income per round and per unit of labor dropped from P$670 at the end of the first phase (Round 4) down to P$232 at the end of Round 11. This sharp decrease was largely caused by the collapse of catches from 9 to 3 kg per round and per unit of labor. At the end of Round 11, the available fish biomass represents only 60% of the initial biomass and healthy coral cover only 13% of the initial cover. Despite new alternative income sources offered during the second phase of the game, most players kept focusing on fishing activities only. As a consequence, average catches halved by the end of Round 7. The doubling of the labor force at the beginning of Round 8, through introducing the second breadwinner, precipitated catch decline even further. However, many players continued to rely on reef fishing as the major source of income for their household. With two units of labor each, households secured P$465 per round on average. This figure nearly matched the minimum "sustainable" daily income (P$500), extracted from local socioeconomic surveys (Cruz-Trinidad et al., 2009).

Game recordings allowed us to understand individual strategies better. Figure 3 summarizes the evolution of strategies during the first three phases of the game. Each household was represented by its unique numbered token during the first two phases (left and center graphs) and by its two tokens during the third phase (right graph). An

Table 2. Overall Ecological and Economic Results at the End of the First Three Phases of the Game (Bolinao, Philippines, September 2007)

	Rounds 1-4	Rounds 5-7	Rounds 8-11
Labor force	10	10	20
Average income (P$/round/unit of labor)	670	340	232
Average income (P$/round/household)	670	340	465
Average catches (kg/round/unit of labor)	9	5	3
Healthy coral cover (% from initial state)	80	60	13
Available fish biomass (% from initial state)	85	70	60

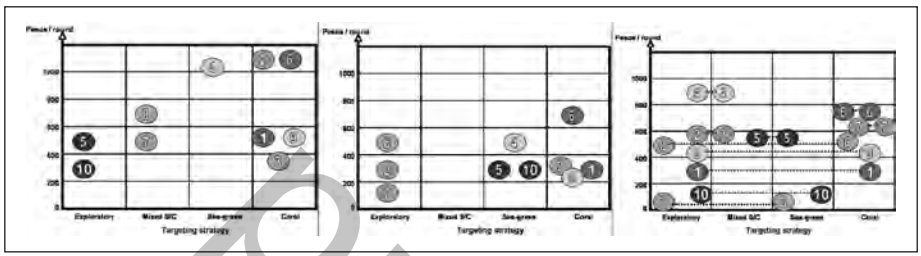

Figure 3. Influence of gaming strategies (*x*-axis) on players' income (*y*-axis) and their evolution during the game (from left to right): (Left) situation at the end of Round 4; (Center) situation at the end of Round 7; (Right) situation at the end of Round 11
Note: Labeled tokens correspond to units of labor used by each of the 10 pairs of players.

analysis of 110 moves (11 rounds × 10 pairs of players) revealed the existence of four major strategies:

- **Coral:** Players fish mainly on reef areas.
- **Sea grass:** Players fish mainly on sea grass areas.
- **Mixed:** Players alternate fishing on sea grass and reef areas.
- **Exploratory:** Players explore other alternatives (including alternative livelihoods).

Strategic choices (*x*-axis) were plotted against the resulting average income (*y*-axis) at the end of each gaming phase. Initially Fishers 2, 4, 6, and 8 were the only ones provided with motorboats.

Over the first gaming phase (Figure 3, left), 50% of players continuously targeted healthy coral cells, regardless of their boat type. Motorboat owners took advantage of their higher fishing capacity, which easily offset higher running costs. Only two fishers (Tokens 5 and 10) consistently explored fishing alternatives (ocean and mangrove areas) with limited success.

During the second gaming phase (Figure 3, center), fish catches sharply declined on 40% of coral cells. As a consequence, almost all players experienced income shortages,

with motorboat owners suffering greater losses. Introducing alternative sources of income did not generate sustained interest from players (except for Tokens 2, 7, and 8) as they considered the proposed wages to be too small (although realistic). Fish biomass on sea grass cells began decreasing as well, leaving players who chose this strategy (Tokens 4, 5, and 10) with mixed results.

The introduction of a second unit of labor in each household (Figure 3, right) resulted in most players splitting their effort between reef fishing (coral and mixed S/C strategies) and alternative livelihoods. Video recordings showed that, most of the time, players moved their "fishing token" after discussing among themselves. This observation suggests that fishing remains the main strategy despite collapsing catches. During this final stage, the lack of communication between the two groups of players (due to the separate boards) created higher tension as players paid greater attention to local coordination in order to fish the remaining stock more efficiently.

Substantive Analysis

Overall, players exhibited "satisfying" rather than "optimizing" economic behavior, confirming a risk-averse attitude within the gaming context. Few players considered upgrading their fishing equipment to improve their catch, not wishing to risk falling into perpetual debt. Despite uncertain catches, fishing was considered to be a stable source of income. Alternative economic opportunities were only used to complement household budgets, on a demand basis only. Players did not consider their current levels of reward, which corresponded to real figures, as viable permanent solutions. Aquaculture, the mainstay of alternative livelihood projects, was also perceived as a risky investment. At one stage, players requested the introduction of a fish marketplace, demonstrating the extent to which their livelihood strategies continued to revolve around the fisheries and related industries. While there is no strong evidence of migration among fishers in Bolinao, elsewhere, rural–urban and international migrations are important drivers of local economies and may prove more important as fish stocks collapse further (Carlos, 2002). Unfortunately, the situation at the end of the game did not allow us to explore either this scenario or the debt relationships.

The debriefing sessions during the game proved to be particularly powerful for individual learning about fishing conservation. During the last round (Round 12), a strong debate about implementing a marine protected area (MPA) caused two participants, who came from a community notoriously resistant to marine parks, to change their views and concede that protected areas help replenish depleted fish stocks. This change of attitude is the kind of outcome sought by education campaigns run by local organizations or international projects in the areas around Bolinao. Despite these campaigns, the actual establishment of MPAs is fraught with local conflicts (Rivera-Guieb, 2002). In line with Meadows (2001), our experiment confirmed an important power of this type of simulation/game. This is that social learning derived from engaging with other participants in a gaming environment is often more effective at challenging individual values compared with more traditional approaches relying on passive transfers of information. In our context,

the game acted as a mediating or boundary object (Bammer, 2005) that facilitated the emergence of a nonthreatening forum where participants created connections between the two faces of their character: player and stakeholder (Barreteau et al., 2007).

Lessons for Practice: Learning to Game

In our case, long-standing contacts between game designers and local researchers were instrumental in getting "things right" in the design of REEFGAME. For example, local researchers suggested restricting initial participants to local fishers rather than engaging in a cross-scale institutional confrontation. Interestingly, they also strongly argued for focusing on game user–friendliness rather than on the accuracy of the underlying model. Both contributions resulted in the creation of a relaxed and informal ambience, conducive to knowledge sharing and dialogue. This aspect confirms the critical role of a cross-disciplinary local team for initiating contact with local networks to build mutual trust and legitimacy, collecting relevant information, and overcoming cross-cultural shortcomings during the participatory process (Dray, Perez, Le Page, D'Aquino, & White, 2007).

While we are unable to state definitively that progressive debriefing worked "better" than a conventional debriefing, facilitators were able to integrate observations and reflections made at different points of the game into the final discussion. It is our strong belief that the design facilitated stronger rapport between facilitators and participants and stronger connections being made between game activities and the participants' real-life activities and decisions. As Stewart (1992) points out, debriefing after experiential activities is an ethical necessity, due to the emotional and intellectual intensity of participation. In longer activities, such as REEFGAME, this ethical imperative urges us to implement a more appropriate form of ongoing (or sandwich) debriefing, thus effectively enabling the kind of "colearning" relationship that she describes. Multiple in-game debriefing points allow participants to assimilate their experiences in a stepwise fashion.

One potential disadvantage of this approach is that the excitement and spontaneous interactions of the game can be lost when formal "intermissions" are called. For this reason, we restricted debriefs to the time it took the computer operator to enter and distribute the results of each round, thereby helping to keep disruptions to a minimum. As a general principle, it is useful to remain flexible and to take one's cue from the participants themselves and adjust the debriefing sessions accordingly.

REEFGAME in the Classroom

In addition to the field activities described above, REEFGAME has been used both in postgraduate workshops and a variety of undergraduate classes. As indicated in the introduction, REEFGAME fills a niche among fisheries games, as it deals with subsistence, rather than commercial fishing.

In educational settings, REEFGAME has enabled students to learn about human-environment interactions in the coastal zone and the idea of "poverty traps" (Cinner et al., 2009) as well as a range of ecological concepts. In particular, it provides students with

a more sophisticated demonstration of the complexities of common pool resource management than typical workshop games. These typically involve candies in a bowl and a rapid pillaging of resources. Without intervention from tutors and demonstrators, such games often fail to elicit discussion of important ecological concepts such as thresholds, feedback, ignorance, uncertainty, stochastic events, and synergistic or nonlinear interactions between social, cultural, and economic factors. REEFGAME, on the other hand, enables students to explore the (contested) truth of statements often thrown around in their environmental studies lectures, such as "you don't manage the environment, you manage people" and "it's hard to be green when you're in the red."

As university workshops and laboratories tend to be only 1 to 3 hours long, REEFGAME's fishing dynamics are further exaggerated in the classroom setting, with lower baseline fish stocks and lower thresholds set for the disappearance/degradation of the reefs. This is adjusted depending on how many students will play and for how long. In addition, because of the flexibility of the Cormas platform, the facilitator can introduce other scenarios (e.g., red tides), which would dramatically change the available fish stocks, while manually changing the fish biomass available in each cell to further explore other socioecological concepts such as uncertainty and disaster response.

Although we support Meadows's (1999) emphasis on the importance of simplicity in gaming, our experience indicates that students (and workshop participants more generally) are neither stimulated nor challenged by overly simplistic games (particularly in those that last several hours). As with all models, although REEFGAME creates a simplification of reality, its ability to accommodate a range of scenarios and interactions among the players contributes significantly to its success as a stimulator of ideas, conversations, and learning. Meadows's (1999) suggestion to "carefully" integrate a number of simple games in order to build up different lessons can be achieved through the sequential introduction of REEFGAME scenarios in either a workshop or classroom setting. Here, simplicity in activity and algorithms does not necessarily equate to simplicity in outcomes.

Implications for Subsistence Fisheries Management

REEFGAME was designed to help find answers to the following questions:

- How do fishers frame and understand their livelihood options?
- How can conservation initiatives be effectively introduced and enforced?

Our REEFGAME experiment gave us some interesting insights for both questions.

First, there is more to traditional fishing in subsistence conditions than economic rationality. Players continued to target their usual fishing grounds (mainly coral cells) despite sharp declines in catches. Alternative sources of income are not attractive enough to stop fishers fishing. Fishing is still framed as a stable income source, with other sources being viewed as irregular and seasonal. Furthermore, an informal exercise conducted at the end of the game showed that fishers would only consider shifting to the offered

alternative livelihoods if wages were considerably higher than they were at the time (and probably beyond what the local economy could afford).

Video recordings of discussions during the last phase of the game revealed players' perceptions of marine protected areas. Locating and zoning the MPA on the game board was not a major issue for players involved in the discussion, probably because community-based management has a relatively long history in the area. Likewise, players belonging to the other group accepted this new constraint relatively placidly.

Agreeing on law enforcement rules governing the MPA was another matter. Some players called for radical measures involving confiscating boats and catches, while others—mainly women—argued that local collusion between rangers and illegal fishers translated into the virtual impunity of poachers. So-called "paper parks" scattered across the Coral Triangle in Southeast Asia are often consequences of the failure to effectively enforce MPA boundaries or provide appropriate alternative livelihoods for subsistence fishers (Mora et al., 2006).

Replicating this experiment will help us inductively to build a consistent knowledge base and framework for action. In late 2009, we received additional funding from the David & Lucile Packard Foundation to replicate the REEFGAME experiment across five provinces in the Philippines. This will offer a unique opportunity to investigate and compare the livelihood strategies across different regions with varying economic and social drivers such as tourism, forestry, and mining, as well as further investigate the effectiveness of game and debriefing design for diverse audiences. REEFGAME will be tailored to each province, in order to investigate its adaptability and the extent to which it can serve as an effective springboard for discussion and decision making, given the different social, ecological, and economic characteristics across the provinces.

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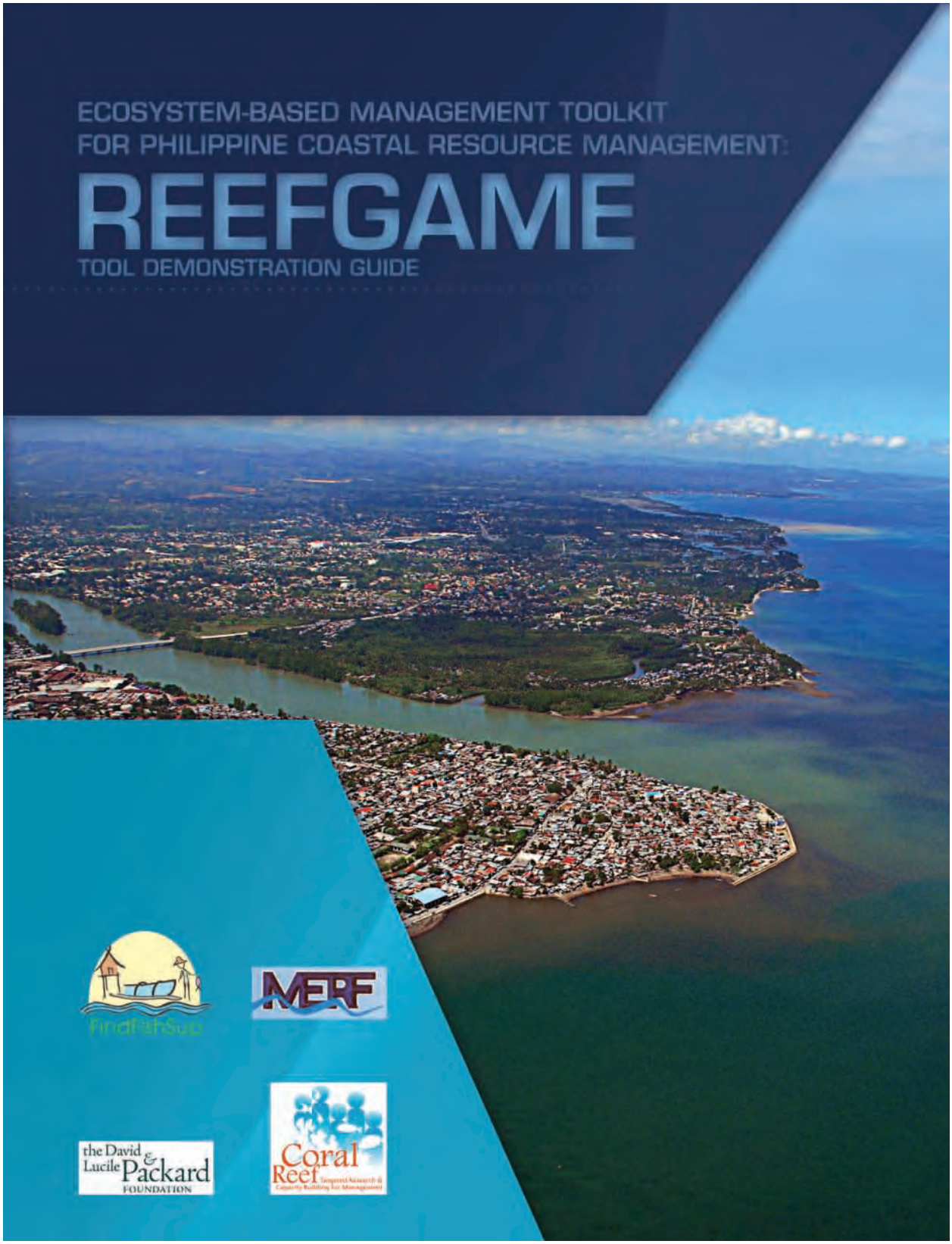
Appendix 3 ReefGame 1.0 v 2.0

ReefGame 1.0 (single stakeholder game)	ReefGame 2.0 (multi-stakeholder game)
Only role is fishers	Incorporated environmental and social ratings for the LGU into model (the former based on reef health, the latter on fisher economic wellbeing)
	Created tourism and aquaculture industry as active roles, together with 'high' and 'low' season scenarios (corresponding to arrivals of tourists and available employment)
	Created LGU players with active roles in managing marine area and encouraging alternative livelihoods and conservation through incentives, like training and stipends.
	Developed schematic profile cards for each extra role
Single generic map	Redesigned game board and map, customised for each field site
No pelagic dynamics, except 'jackpot' fish	Updated pelagic dynamics updated to reflecting reported catches from regional surveys and known local ecological characteristics
	Added payao (Fish Aggregating Devices), which, when installed by LGU player, 'attract' all the fish from the surrounding cells, enabling higher catches in that location
Few generic, fixed livelihoods	Added aquaculture and small businesses, which have variable income with adjustable ranges
	Incorporated extra livelihoods, and ability to add new livelihoods easily mid-game
No illegal fishers	Incorporated automated illegal fishers into the model, deployed by game master as required/desired
Profiles in English, no graphic user interface to the computer model	Created graphic user interface and illustrated profiles for all player roles, in Tagalog
Players can only choose a single livelihood	Added option for second livelihoods, such as volunteer coast guard stipends; gamemaster enters amounts into interface
Only three kinds of gears.	Diversify gear options, according to updated regional surveys (including bagnet, a commercial gear)
Players cannot switch or sell boats or gears	Incorporated players buying and selling gears and boats
Employment is only option for 'household' player	Incorporated school/education as option for household player with corresponding price for players

Appendix 4 ReefGame instructions


ECOSYSTEM-BASED MANAGEMENT TOOLKIT
FOR PHILIPPINE COASTAL RESOURCE MANAGEMENT:
REEFGAME
TOOL DEMONSTRATION GUIDE
FindFishSup
MERF
the David & Lucile Packard FOUNDATION
Coral Reef

ReefGame Tool Demonstration Guide: A Game to Explore Livelihoods & Marine Conservation in Fishing Communities

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Introduction to ReefGame

What is ReefGame?

ReefGame is a linked board game and computer model that can be used to explore alternative and supplemental livelihoods and coral reef conservation in fishing communities. Game-boards represent the coastal area and habitats of the modeled area. While fishers and other stakeholders play the game, a computer model calculates fish catches and the impacts of the players' decisions on marine habitats.

The game setting helps fishers and other stakeholders to engage in lively discussions and reflections about available options to secure both their daily needs and the long-term sustainability of coastal fisheries and coral reefs.

How has ReefGame been used?

ReefGame was used to generate dialogue and discussion around possible 'ways out' for fishers in depleted fisheries in ten municipalities in the Philippines in several workshops that brought together fishing, government, community, and industry sectors.

Photos by Kenneth Balajadia

Who can use ReefGame?

ReefGame can be tailored to fit local economic, social and environmental characteristics, by adding or changing roles and interactions. Non-government organization (NGOs), government workers and other stakeholders can use ReefGame in half-day or whole-day workshop with 10 to 30 participants. The aim is to encourage communication between:

- Fishers
- Representatives of local government units (LGUs), and
- Prospective employers, such as resort owners, industry representatives and aquaculture operators

Learning how to play ReefGame

The following pages give instructions for playing ReefGame.

ReefGame Instructions

Overview

This section covers the following:

- Materials needed
    - Game board
    - Computer model*
- Roles of participants
- Getting started
- Suggested Game Scenarios
- Facilitation & Debriefing

*Complete instructions for operating the ReefGame computer model are available in the ReefGame Computer Operator's Guide downloadable from http://philcrm.org and in the accompanying EBM Toolkit CD.

Materials needed

To play ReefGame you will need the following materials (included in the ReefGame starter pack and downloadable from http://philcrm.org):

- Game board
- ReefGame computer model
- Habitat and livelihood cards
- Participant role-playing profiles (see 'roles' for more information)
- Fisher and fisher's son tokens (10 each)
- Play money

Game board

The game board represents any coastal area on a grid made up of cells representing sea and land (see Figures 1 & 2). Each box or cell in the grid has a corresponding number, which is used in the computer model. Selected "sea" cells have habitat cards, preferably representing the actual location of mangroves, seagrass and corals in the area of interest. Particular "land" cells have livelihood cards, one for each of the alternative livelihoods available (this can be modified according to locally available opportunities and the imagination of the players and facilitators!).

Figure 1: ReefGame board, showing fisher boat tokens, ports (large numbers in the middle of green squares) and habitat cards.

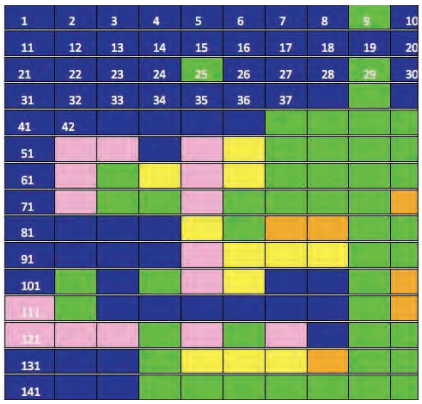

Figure 2: Schematic ReefGame board colors represent specific cells (green = land, pink = coral, orange = mangrove, yellow = seagrass, blue = sea)

CASE STUDY: Check your map!

The two municipalities on Lubang Island (Looc and Lubang) played ReefGame using a map representing the whole island. A boundary dispute came up when Lubang's LGU wanted to set up seaweed farming. Looc's Bantay Dagat said that the proposed location was in Looc's municipal waters. The lesson learned here is that when making the game board, both land- and sea-based landmarks must be considered, especially those that are important to the decision process of fishers, stakeholders, and coastal resource managers.

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ReefGame computer model

The ReefGame computer model calculates:

a) fish catches, based on habitat, chance, gears and type of boat
b) illegal fish catches
c) number of illegal fishers caught, depending on their numbers and the number of Bantay Dagat
d) fishers' salaries, depending on the alternative livelihood they have chosen
e) tourism, aquaculture and industry income, depending on season and chance
f) LGU revenue, depending on tourism arrivals and industry profits (the LGU can also collect extra revenue from players throughout the game)
g) changes to the environment:
When fish stocks on a coral cell drop below a threshold, the coral dies and is covered by algae. The facilitator will then swap the coral habitat card for an 'algae' card on the game board, as a visual signal of declining reef health.

These results are displayed on a user interface. The interface should be shown to participants on a projector screen, so that they can see their individual outcomes, as well as those of the other players.

Instructions on how to use the computer model in conjunction with the board game can be found in the ReefGame Computer Operator's Guide, available from the CD and at http://philcrm.org.

Roles of Participants

The following sections give a brief description of each of the roles of the participants /players in ReefGame:

- Fishers
- LGU representatives

- Tourism Operators
- Aquaculture Operators
- Industry
- Banker and/or Fish buyer

Complete profiles and instructions for these can be found in the ReefGame starter pack or at http://philcrm.org.

The only essential roles are the ***fishers*** and the ***banker***. Other roles are optional, but add more interest to scenarios and discussions. It is not necessary that the players' roles correspond to their real-life activities. However, if people are role-playing, their decisions may not be realistic. On the other hand, role-playing offers stakeholders a chance to understand the fisheries situation from a different point of view.

Fishers

Ten players take on the role of fisher and head of family. Each fisher is given a boat, a port (a square on the game board that serves as his "house") and a fisher profile.

Each fisher's objective is to earn enough to meet their family's expenses, through fishing and other livelihood activities. Because each fisher has different assets (type of boat and gear) and family sizes, income generating potential and expenses are different for each fisher. This can help spur discussion about inequality and justice, particularly when playing ReefGame with students.

Fishers can also play in pairs if there are too many participants.

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Tourism Operators (boats and resorts)

Up to three groups of tourism operators can participate in ReefGame. Each tourism operator aims to be profitable. Whether they are also socially and environmentally responsible depends on individual players. Tourism operators can either be resort owners or tourist boat operators. All tourism operators need to employ at least one fisher to receive visitors. They can decide on the salaries offered.

Aquaculture Operators

One or two players take on the role of aquaculture operators. Each operator starts with one pen. They can buy more pens, but each pen requires investment (e.g., license to operate from the LGU) and a caretaker. The operators can choose which fishers to hire as their caretakers.

Industry

One or two players take on the role of industry sector representative. Their role as an employer is to determine which fishers are suitable to hire.

Fish buyer & banker

The fish buyer gives fishers their catch income as dictated by the computer model.

The banker accepts the payments of the fishers for their household expenses. The banker is also responsible for giving out salaries for livelihoods not associated with an active role (e.g., tricycle driving, farming, construction, etc.).

LGU

Between 1 and 3 people take the role of LGU. The LGU aims to keep a high public approval rating (based on the economic situation of the fishers) and a healthy environment (based on fish stocks and coral health) (see diagram, Figure 3).

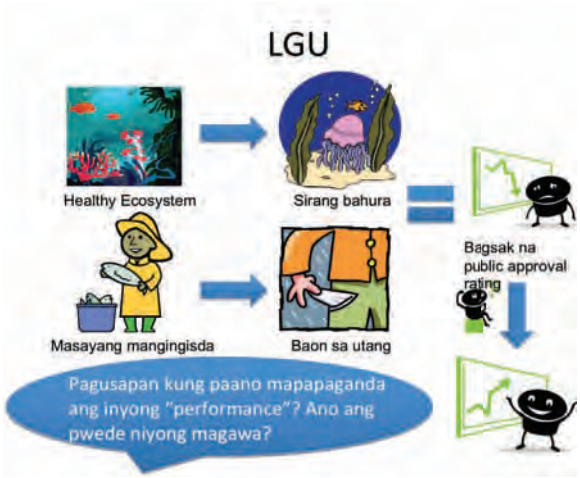

Figure 3. Diagram showing the role of the LGU

Getting started

Before organizing a ReefGame workshop, facilitators should decide which local issues they would like to explore. They also need to be familiar with all aspects of playing ReefGame, as laid out in this booklet and in the accompanying ReefGame Computer Operator's Guide (available in the accompanying CD and at http://philcrm.org).

At least two staff is needed to run ReefGame, the **facilitator** or **game master** and the **computer model operator**.

It is important to invite a diverse range of stakeholders to ReefGame workshops. Even if the focus is solely on fishers, care should be taken to include different groups, for example, those who are not involved in local management organisations and recent migrants.

Facilitators should also be prepared to deal with potential conflicts between the different stakeholders, as ReefGame often touches on sensitive local issues, such as illegal fishing and restriction on gears and/or fishing areas on conservation grounds.

At the beginning of a ReefGame workshop, participants need to be assigned roles, and told about their specific tasks and objectives. Each participant should be well-briefed about their role and understand what they have to do in the game.

Case study: The Importance of Clear Explanations

In Lubang Island, Occidental Mindoro and Puerto Galera, Oriental Mindoro, fishers had a hard time internalizing their role in the first few rounds of ReefGame. They were basing their decisions on their real life situations like what gear and type of boat they have in reality rather than on the profiles given them for the game.

In contrast, ReefGame in El Nido, Palawan, involved much more role-playing. Fishers and LGU played themselves, but local NGOs played the resort owners, and some fisher roles were taken up by representatives from government agencies. After clear instructions from facilitators, players internalized their roles well.

Facilitator's tip

TIP

Ensure that all players have understood their roles before beginning to play. Talking them through their profiles can help where some participants may have difficulty reading the profiles provided. It is better if the profiles are written or explained in the local dialect – the profiles provided in the EBM Toolkit are in Filipino. These can be modified as necessary.

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Suggested Game Scenarios

The game has four successive phases. Each phase introduces new interactions and decisions for the players.

1. Fishing only
2. Alternative livelihoods
3. Household strategy
4. Management interventions

These scenarios can be adapted to fit local issues and concerns. In addition, there are extra scenarios, described at the end of this section, which can be introduced at any time. The following section introduces each scenario. Each scenario has facilitator tips and case studies.

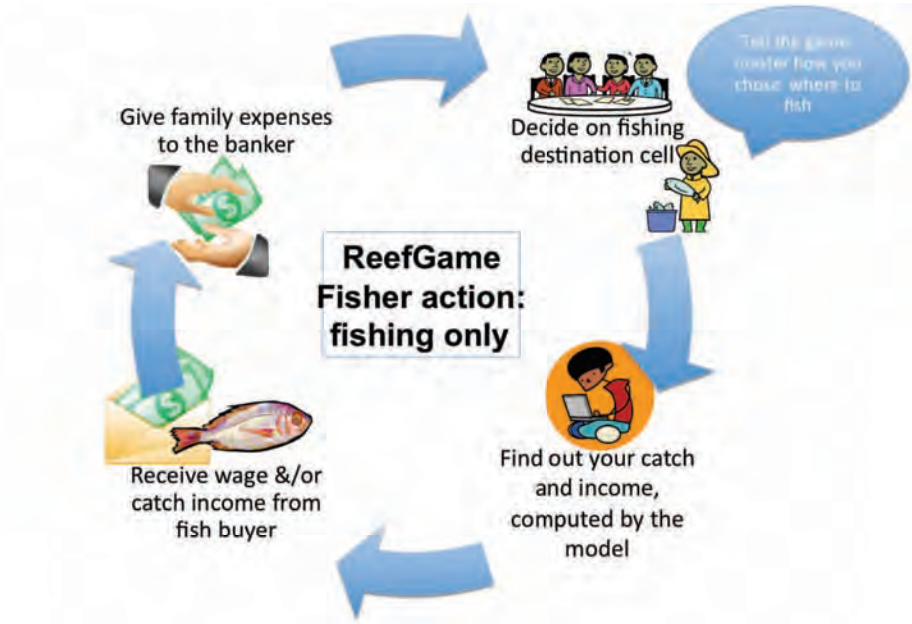
1. Fishing only (~rounds 1 to 4):

Fishers can only choose "sea" cells as a destination. Initial rounds familiarize the players with the game, and allow them to see changes in volumes and composition of catches.

To reach their goal, each fisher decides at the beginning of each round where to go fishing on the game board. The computer operator will enter in the cell number of their fishing destination into the model.

Then, the computer model calculates individual catches and incomes. Fishes are divided into two types: higher value, 'big' fish and lower value, 'small' fish. Each type of fish has a fixed value. Using the results from the model, each fisher collects the value of their catch from the banker.

11



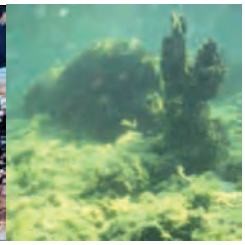
Why use play money instead of just writing down values?

When players have play money, they can lend to each other, or alternatively, form partnerships when opportunities for investment arise. Play money also makes it obvious who is 'doing well' (or not), which is an important discussion point (Who is rich? Who is poor? Why?).

After fisher players receive their gross earnings, they pay the banker the corresponding family expenses. These are listed in their profile. The family expenses represent the money spent for daily subsistence of the family. This value is dependent on the number of household members.

What are the signs of overfishing?

coral



algae

The ReefGame computer model calculates when coral dies dues to decreasing fish stocks on coral cells. The corresponding coral habitat card is swapped for an 'algae' card (depicting dead coral, covered with macroalgae) on the game board, as a visual signal of reef degradation. This mechanism prompts discussion about the links between fishing activities and coral reef health. An expert may be invited to explain and answer questions regarding this issue or phenomenon.

Case study:

In Lubang Island, Oriental Mindoro, some of the corals turned into algae in the first rounds of ReefGame. One fisher from Lubang appealed to the other players on their board if they could agree to stop fishing on coral reefs for some time. He said they should protect the reefs and allow them to recover first. Other fishers understood his sentiment but they still opted to fish on coral reefs. Subsistence of the family would always come first, and since coral reefs give the fishers a bigger catch, they would still continue to fish there. Having no options for other sources of income also hinders them from choosing fishing grounds where they would catch relatively fewer fish. At the end of the round, the fisher who appealed not to fish on corals decided to fish on coral reefs too. This shows the influence of group decisions on an individual fisher's decision. Even if one fisher realizes the need for the protection of resources, if he is alone in the effort, he would choose to remain competitive and fish in areas that would also give him a large catch.

Facilitator's tips

TIP

During these rounds, players should begin to think about what is happening to their environment, e.g., why and how fish catches are changing, and why they are different from each other (e.g., having different gears / boats) and compare this with their own experiences. To help them do this:

- Involve the LGU – try to encourage discussions for potential solutions, 'what is happening and what could/ should be done to improve the situation?'
- Encourage the interest and participation of the tourism participants
- Ask the fishers about their strategies and decision-making processes – e.g., how do they decide where to fish? Where do they fish and why?
- Ask participants 'why is this happening?', if coral turns to algae
- Have 'ask the expert' portion, where a marine scientist can explain why corals die when they are overfished (and other reasons why corals might die)

2. Alternative livelihoods (~rounds 5 to 7):

Participants can decide either to continue fishing or to explore alternative livelihoods. Pre-programmed options are: fish pen caretaker, construction worker, ferry crew, taxi/tricycle driver, unskilled tourism worker, and farm worker. These can be added to or modified according to locally available opportunities and the imagination of the players and facilitators! Appropriate salaries can be negotiated with players or decided by the facilitators.

Depending on the other roles being played, fishers may need to negotiate whether they can be employed. For example, if fishers want to work in a resort, they will need to convince the tourism operators that they have the necessary skills to work there. Operators should carry out mini-interviews and negotiate appropriate salaries.

Fishers can also invest in an outboard motor to improve their fishing capacity (if they have non-motorized boats in the beginning of the game), or buy a fish pen to develop an aquaculture business. The LGU can charge for boat and fish pen licenses. Fishers cannot fish and look after their aquaculture pen at the same time.

Case study: Participation in alternative livelihoods

In Puerto Galera, Oriental Mindoro, the most popular livelihoods were those associated with the tourism industry. However, fishers only wanted to shift from fishing if they were guaranteed high incomes, and would often combine alternative livelihoods and fishing, alternating each round. LGUs and local NGOs can use these dynamics to explore how they can best support fishers to move out of depleted fisheries.

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3. Household strategy (~rounds 8 to 11):

Each pair is given an extra token and asked to determine the activities for another breadwinner in the household (could be a spouse or child). This allows participants to diversify their strategies. Adding 10 extra actors also mimics population increase, adding further stress on fish stocks.

Extra variations:

Fishers can set up micro-business enterprises. Facilitators should encourage players to 'pitch' their idea, either to other players, or to the LGU. In addition to giving permission, the LGU can also collect business permit fees.

Fishers may also send their 'child' (the extra breadwinner) to school or college. The costs for this can be decided by the facilitator or negotiated with players. Other items can also be available for purchase, for example mobile phones and motorbikes.

Case study: Micro-enterprises

In Batangas City, fishers set up a number of micro-enterprises, including goat and chicken farms and grocery or "sari-sari" stores. This generated discussion about the role that entrepreneurship can play in securing alternative livelihoods for the fishers. Towards the end of the game, the facilitator told the fishers that their sons had all been killed in an epidemic. In response, a fisher set up a funeral parlor. This may seem like a joke, but it started a conversation about exploiting the economic opportunities that are locally available and demonstrated the ingenuity of the fishers in seeking to create extra income for their families.

Case study: Fisher spending

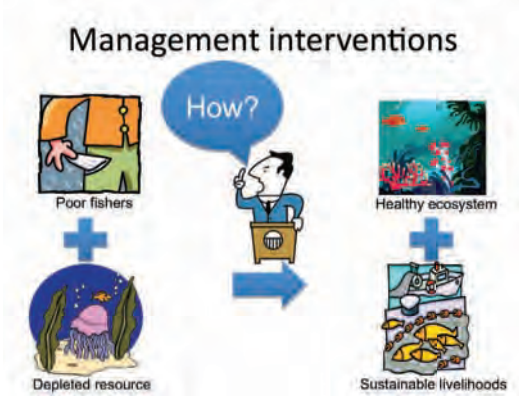
In Lubang Island, Oriental Mindoro, to explore how fishers spend the income they got, aside from their daily subsistence needs, they were offered different items like education for their children, boat, fishing gears, cell phone, and motorcycle. They could ask for any item they want, and the game master would set a price for it. Two fishers invested in their children's education, one was the basnig fisher who got an average of P1250 per round, a lot more than the other fishers. The other players were also contemplating sending their children to school, but they claimed they did not have enough money. One fisher said the priority is of course to feed their family. Facilitators noticed that fishers in this area preferred to save up, and hypothesized that this was because of the relative isolation of Lubang. Fishers could then use their savings as a buffer against poor fishing seasons, for example.

4. Management Initiatives (~round 12):

During this round the LGU players lead consultations and decision-making about management initiatives to maintain and enhance the marine environment.

Some suggestions for management interventions are:

- Marine protected area establishment
- Gear restrictions
- New livelihood programs and training
- Open and closed seasons
- User fees or environmental fee



This is an opportunity for players to discuss and learn about sustainable financing mechanisms. Fishers can be asked to contribute to the costs of fisheries management, for example through donations, licenses or user fees.

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Facilitator's tips

TIP

- There should always be a cost to the LGU for management interventions – this can be decided by you or negotiated with the players.
- Encourage LGU to facilitate negotiations, not dictate.
- Encourage fishers and other players to confront the LGU if they are not consulted about changes on their access to the fishery.
- This scenario helps address issues of marine stewardship, access rights, justice and sustainable financing. Try to make sure that these issues are discussed and negotiated as openly as possible.

Case study: Exploring Sustainable Financing and Ring Fencing

In Masinloc, Zambales, fishers chose to donate a portion of their income to help set up a Marine Protected Area (MPA). In return, fishers wanted to have first access to the buffer area outside their MPA, as they hoped that the 'spillover effect' would increase their catches. This shows two things. Firstly, fishers are willing to contribute to conservation efforts, especially if their access rights are protected or enhanced. Secondly, where NGOs or LGUs may see MPAs as primarily for conservation, fishers tend to expect a pay-off in the form of increased catches. As this might not always be realistic, MPA implementation may need to be accompanied with other livelihood enterprises such as hatcheries.

In Puerto Galera, Oriental Mindoro, the environmental fee rate was based on the real amount collected for user fees at the Batangas Port. The total amount received by the LGU was dependent on the number of tourist arrivals. They used these funds to set up several Marine Protected Areas during the management intervention scenario.

Extra Scenarios

These extra scenarios can be introduced to generate additional discussion.

Illegal Fishing

Facilitators can introduce illegal fishers. The computer operator can set the number of illegal fishers between 0 and 10. The level set should reflect the proportionate number of fishers intruding into municipal waters. Fishers can also work as part time bantay dagat. This scenario can be used to spur discussion on how to control encroachment, and the impact of illegal fishing on the marine environment.

Tourism seasonality

Tell your computer operator if you want to implement the high or peak season (suggestion: approximately once every 3 rounds).

Pollution / global financial crisis / natural disaster

Problem with sewage, rubbish, red tides, the world financial markets or natural disasters (e.g., typhoons: no tourists arrive). This scenario can be used to encourage discussion of the dangers and vulnerabilities of tourism development.

In addition to these pre-designed scenarios, other scenarios can also be implemented based on suggestion from participants, for example by adding other livelihood choices or changing wages, fishing costs or fish prices.

Facilitation and Debriefing

Facilitators should make sure that participants have a structured opportunity to reflect on and share their experience within the game setting, connect this with their real life context, and derive new knowledge and understanding from these comparisons. Allowing participants to discuss the activities at different points in the game (e.g., after each new scenario is introduced) gives both facilitators and participants a chance to 'digest' or 'process' what is happening in a step-wise fashion. This will reduce the chance of recasting, forgetting or ignoring initial impressions in evaluating the lessons and worth of the activity. This is particularly important with ReefGame, as it is usually played over a number of hours.

Facilitators need to make sure that all participants in ReefGame get a chance to share their opinions and ideas. More articulate and confident players, such as those with a higher level of education, can tend to dominate discussions. It is the facilitators' role to ensure that everybody has a voice.

The facilitators should hold group round-tables between each round so participants could discuss and justify their decision-making processes. In addition, before changing scenarios, the group can be asked to reflect on: i) the strategies they developed and why these were successful or not; and ii) the changes in the marine environment. A final debriefing stage can be dedicated to collectively analyze and evaluate the activity, group sharing and individual learning, and to discuss the potential for real-life application of the lessons learnt.

Some suggested questions to evaluate the activity are:

- Did you enjoy the workshop and why?
- What did you learn?
- What can be applied in real life?
- What would you have done differently?
- What recommendations would you make to the government (LGU, provincial, national)?

Depending on the audience, facilitators can also introduce discussions about characteristics of marine commons management, such as

- free riders – people who benefit from the sacrifices of others, without contributing themselves, e.g., those who do not contribute to the cost of establishing an MPA, but expect to benefit from spillover effects;
- rule-breakers; e.g., fishing inside the MPA; and
- the impact of power dynamics, for example between richer and poorer fishers, between employers and employees, and the fishers and government representatives.

About the authors:

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Deborah is a PhD student at the Fenner School of Environment and Society, ANU College of Medicine, Biology and Environment at The Australian National University (ANU). She graduated with a BA/BSc(Hons) from ANU after completing a thesis focusing on using visual tools, including participatory models and board games, for coral reef and coastal management in the Philippines. Through her PhD, Deborah will continue to examine the utility and potential benefits of using creative techniques to explore alternative livelihood options and locally-based stewardship arrangements in artisanal reef fisheries, as well as the nexus between art and science. She is completing six months at the University of the Philippine's Marine Science Institute as part of the Australian Government's Endeavour Research Fellowship program.

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ReefGame Computer Operator's Guide

v1.0

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About this guide

This guide accompanies the ReefGame Software and Tool Demonstration Guide, also downloadable from www.gefcoral.org

Mac and Linux users will need to install VisualWorks Community Edition (freely downloadable from the Internet) to run ReefGame.

This guide was published by the Marine Environment & Resources Foundation, Inc., University of the Philippines Diliman, Quezon City, Philippines through the David and Lucile Packard Foundation.

About ReefGame

REEFGAME was developed with support from the Australian National University, the University of the Philippines Marine Science Institute and the Coral Reef Targeted Research & Capacity Building for Management (CRTR) Program. The CRTR Program is a partnership between the Global Environment Facility, the World Bank, The University of Queensland (Australia), the United States National Oceanic and Atmospheric Administration (US NOAA) and approximately 50 research institutes and other third-parties around the world. Contact: Coral Reef Targeted Research & Capacity Building for Management Program, c/o Global Change Institute, Gehrmann Building, The University of Queensland, St. Lucia, Queensland 4072, Australia. Tel: +61 7 3346 9942 Fax: +61 7 3365 4755 Email: info@gefcoral.org.au; Internet: www.gefcoral.org

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Part 1: Starting up and setting initial values

1. Transfer the ReefGame software folder from your ReefGame CD on to your computer, or download 'ReefGame software' from http://philcrm.org

2. Double click the ReefGame.exe icon (Windows users) or the ReefGame.im icon (Mac). Mac users will need to have VisualWorks Community Edition (free and downloadable from the internet) installed on their machine.

ReefGame icon

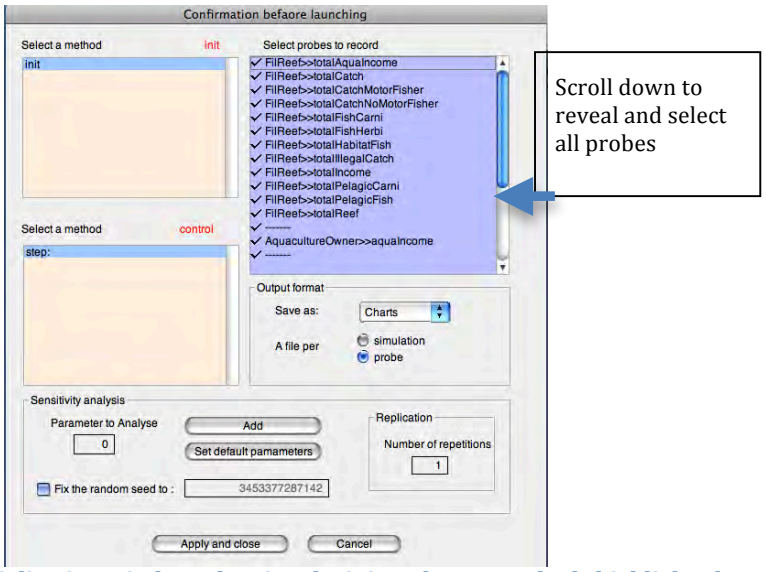
Result: the ReefGame window and the simulation window appears

Cormas main window with ReefGame launched

3. Click 'initialize'

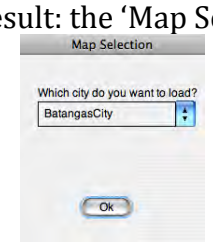
4. Select the 'init' and 'step' methods (click on the method to highlight it) when the initialization window appears.

5. If the probes are not ticked already, select all the Probes, holding down shift or control to select multiple Probes. Remember to scroll down to select



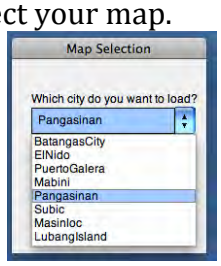
Initialisation window, showing the init and step: methods highlighted, and all the probes ticked.

6. Click 'apply and close'
   Result: the 'Map Selection' window appears



Map selection window

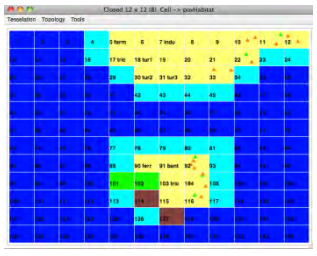
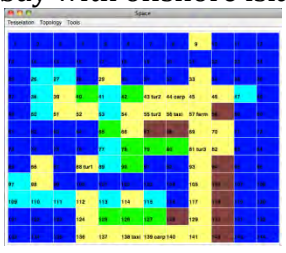
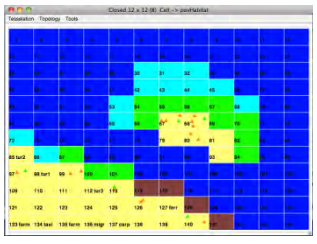
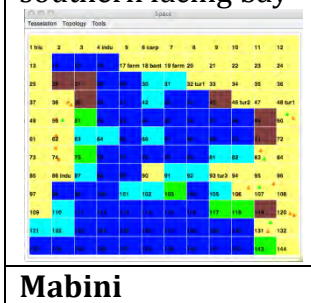
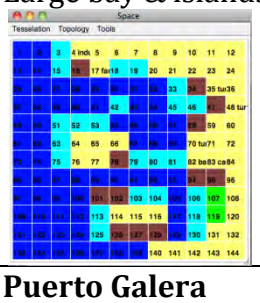
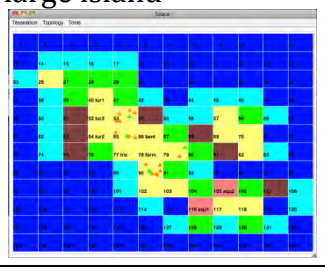
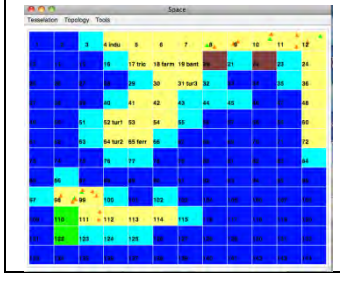
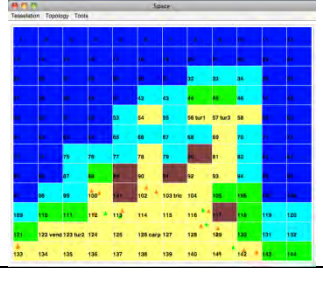
7. Select your map.



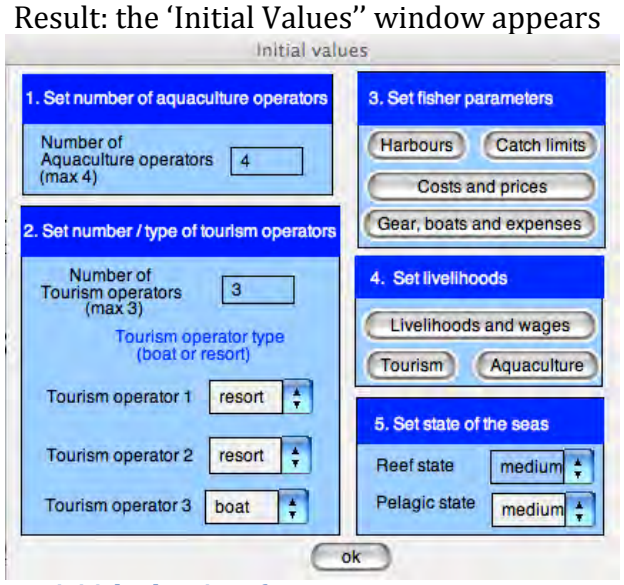
Map selection window showing 'Pangasinan' selected

Note: This version of ReefGame does not allow you to choose your own maps. However, there are eight pre-programmed maps, which correspond to a range of different coast line typologies. These are presented below.

Typology of Maps

Batangas island south of mainland 	**El Nido** bay with offshore islands 	**Pangasinan** island north of mainland 
Subic southern facing bay 	**Masinloc** Large bay & islands 	**Lubang Island** large island 
Mabini Peninsular & island 	**Puerto Galera** Small bay & headland 	

Result: the 'Initial Values'' window appears

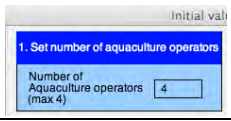
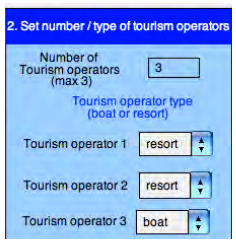


initial values interface.

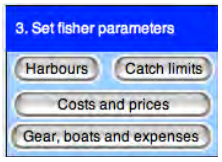
8. Check the values on your 'Initial Values' interface, adjusting where necessary.

- The next sub-steps explain the different parameters you can choose, following the instructions on the 'Initial Values' interface.
- Usually the only values you will want to adjust are the catch limits per gear, based on local fishing ranges (**step 8c**) and the livelihoods and wages (**step 8d**)
- If you do not want to change any of the initial values, continue to **step 9**.

Changing initial values (Steps 8(a)-8(e))

8a 	Set number of **Aquaculture operators** • This needs to be between 1 and 4 (they can remain idle, so even if you don't have 4 players, you can leave it at 4)
8b 	Set number / type of **tourism operators** • Tourism operators: between 1 and 3 (can also remain idle, so usually leave at 3); • Tourism operator types: each tourism operator can either have a resort or operate tourism boats (for transport or sight-seeing) **Note:** These need to match the tourism profiles that you give the tourism players. Sample profiles are available in your ReefGame starter kit. For more information on tourism players and profiles, see the ReefGame Tool Demonstration Guide.

8c

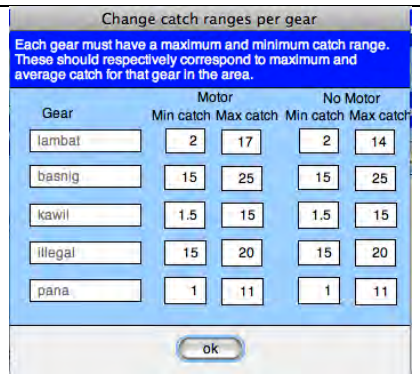


Set fisher parameters

- Click on the buttons to adjust each group of parameters in turn
- These should match the profiles given to the fishers. Sample profiles (in Filipino) are available in your ReefGame starter kit.
- See the ReefGame Tool Demonstration guide information about profiles and role-playing
-

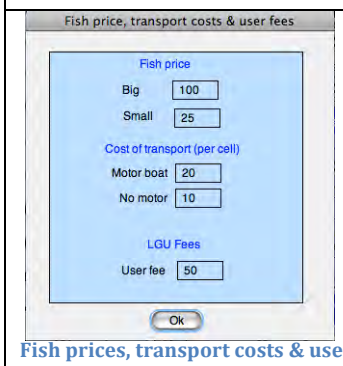
Set harbour

Harbour: adjust the fishers' harbour cells



Change catch range per gear

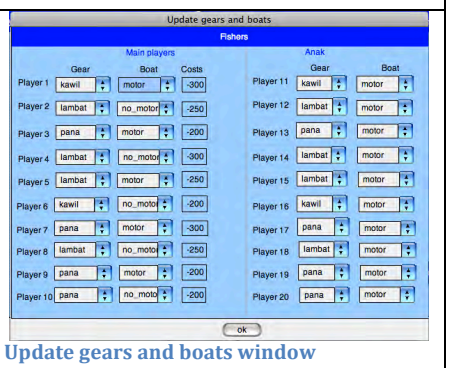
Catch limits: sets the catch limits for any gear. This should roughly correspond with the maximum daily catch (max) and the mean daily catch (min) for each gear type.



Fish prices, transport costs & user fees window.

Costs and prices

- **Fish price:** big and small fish – should correspond to local prices for high and low value fish.
- **Cost of transport:** should reflect actual daily costs of going fishing. It is a 'per cell' transport cost (eg 10 pesos per cell travelled away from harbour.)
- **LGU User Fee:** the environmental fee charged to tourists by the Local Government Unit (LGU)



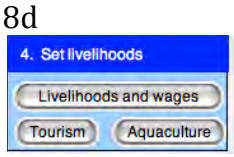
Update gears and boats window

Boats, gear and expenses

Gear: each fisher can either use kawil, pana, lambat, basnig or 'illegal' (eg dynamite/blast or cyanide fishing). Usually only legal gears will be assigned, but it depends on facilitators)

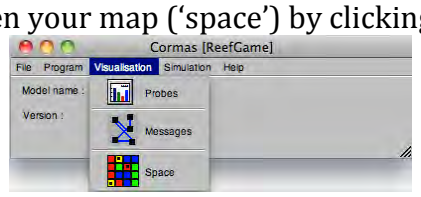
Boats: each fisher can either have a motor or non-motor (no_motor) boat

Costs: each fisher family/pair has a cost which corresponds to their households expenses. They give this amount to the market each round (see ReefGame Tool Demonstration Guide)

8d  	Set livelihoods (see Part 3: Adding different livelihoods and enterprises/small businesses, p12) • Default livelihoods are set for each map. To view these, click the livelihoods and wages button. • Tourism operators also have default locations. To view these, click the tourism button. • Aquaculture operators do not have default locations. To set theses, click the aquaculture button • Further instructions on adding and changing livelihoods can be found in the ReefGame Tool Demonstration Guide
8e	Set State of the sea (pelagic and reef): this determines the initial state of your resources (good, medium or bad)

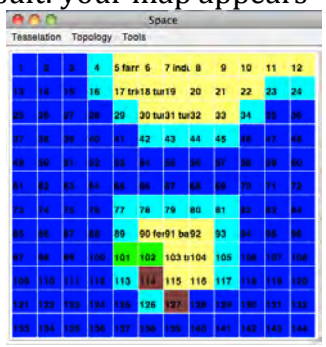
9. Click Ok
   Result: the window closes, and you are left with only the simulation window and main cormas window open

10. Open your map ('space') by clicking 'visualisation'> 'space'



opening your map through the visualisation>space menu path

Result: your map appears



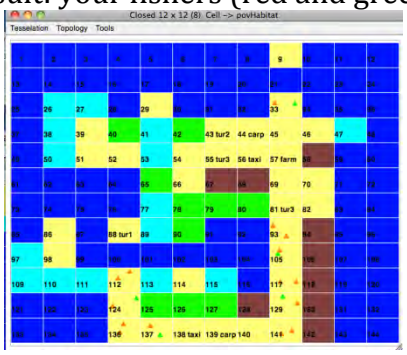
example map (Batangas City)

11. Show the location of your fishers by:
    a) right clicking anywhere on the map
    b) selecting fisher > pov boat

    Note: you can do the same with illegal fishers. However, they may not appear on the map until you play the first round.

selecting fisher>povBoat to reveal the fishers

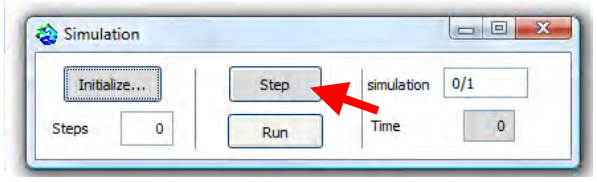
Result: your fishers (red and green triangles) will appear



Example map (El Nido), showing the location of the fishers (red and green triangles)

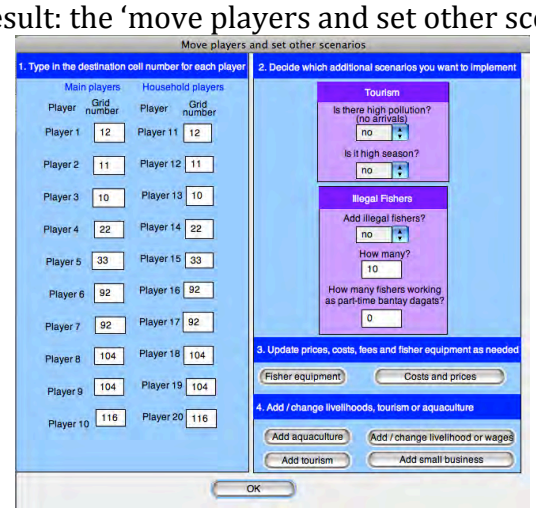
Part 2: Completing one round ('step') of ReefGame

1. Click step on the simulation window



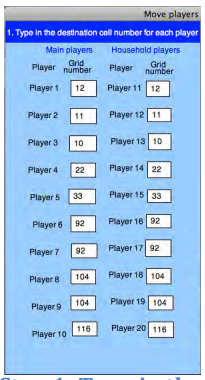
Simulation window showing the step button

Result: the 'move players and set other scenarios' window appears



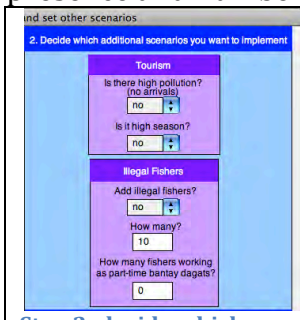
'Move players and set other scenarios' window

2. Type in the cell/grid numbers of where your players want to fish / work in alternative livelihoods, as per their tokens on the board game (see ReefGame Tool Demonstration Guide for more information.)



Step 1: Type in the desination cell number for each player

3. Decide whether to implement the illegal fishing scenario: adjust the presence and numbers of illegal fishers accordingly.



Step 2: decide which additional livelihoods you wish to implement

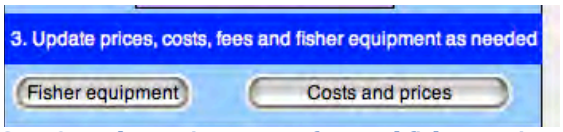
If **yes**:
- a) change the 'Add illegal fishers' field to 'yes'
- b) type in the number of illegal fishers that will be active (up to 10)
- c) type in the number of fisher-players working as part-time coast guards/bantay dagats (ie while fishing): this won't normally occur until a couple of rounds into the game

If **no**: leave defaults

4. Decide whether to implement the high season or high pollution scenario for tourism, and adjust the fields accordingly.

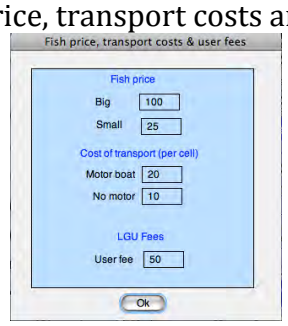
Note: More tourists arrive in the high season. No tourists arrive if there is high pollution.

5. Decide whether you want to adjust the user fees, fish prices or transport costs. If not, go to the next step. If so:
   a) click the costs and prices button on the 'move players' window



Step 3: Update prices, costs, fees and fisher equipment as needed

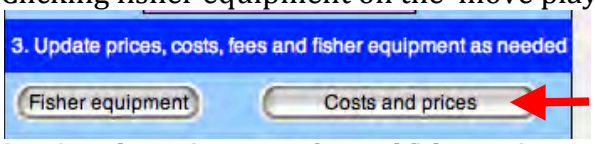
Result: fish price, transport costs and user fees window appears



Fish prices, transport costs & user fees window.

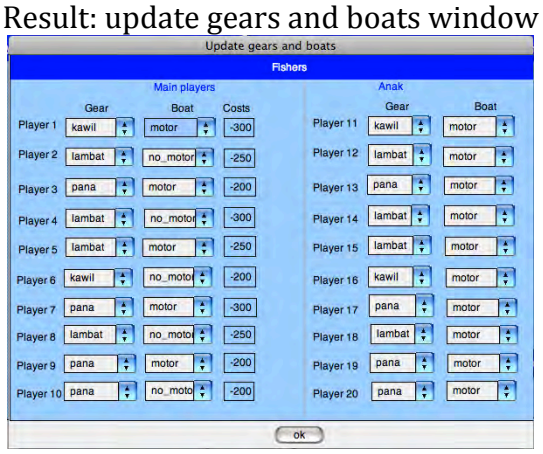
   b) adjust the prices as desired
   c) click ok, returning you to the 'move players' window

6. Check whether any fishers have bought new gears or boats. If not, go to the next step. If so, adjust these by:
   a) Clicking fisher equipment on the 'move players' window



Step 3: Update prices, costs, fees and fisher equipment as needed

Result: update gears and boats window appears



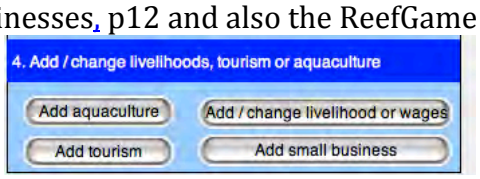
Update gears and boats window

b) Adjusting the gear and boat of the players that have changed.

c) Clicking ok, returning you to the 'move players' window

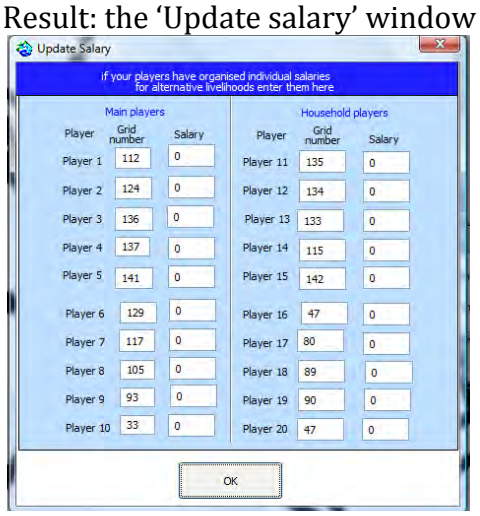
Note: if players sell their boat, they can't go fishing. However, you don't need to change their boat status inside the model

7. Add/change livelihoods, small businesses, tourism and/or aquaculture cells (see Part 3: Adding different livelihoods and enterprises/small businesses, p12 and also the ReefGame Tool Demonstration Guide)



Step 4: Add/change livelihoods, tourism or aquaculture

8. In the 'move players' window, click ok
   Result: the 'Update salary' window appears.



9. Update the salary of any players not receiving the default amount. This may be because they have negotiated an alternative salary level with the LGU, tourism, industry or aquaculture operators. For example, fishers may receive an honorarium for becoming part-time coast guards (bantay dagats).
10. Click ok on the 'Update salary' window

Result: the 'ReefGame Results' window appears

ReefGame Results window

11. Communicate the results to your participants.

Fields in the results window:

- **Big fish**: how many big fish caught by the pair
- **Small fish**: how many small fish caught by the pair
- **Fishing income**: how much earnt from fishing, with the cost of transport already deducted (itemised per main player/ child)
- **Alternative income**: how much earnt from other livelihoods (itemised per main player/ child)
- **Who to get your money from**: option of tourism, aquaculture, fish buyer and market (for all other livelihoods)
- **Total income**: fishing income plus alternative income for each pair
    - **Household expenses**: the amount each pair will need to pay to the banker for their daily expenses.
- **Multa**: this shows whether a fisher should receive a fine, and only applies to illegal fishing in protected areas.

12. Press ok, returning you to the simulation window

13. Continue steps 1 to 11, adjusting parameters according to the options and scenarios described here and in the ReefGame Toolkit.

Part 3: Adding different livelihoods and enterprises/small businesses

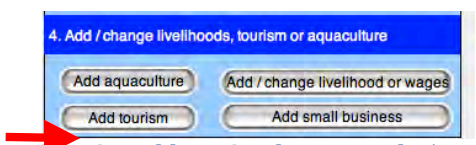
Use these instructions to change the environment to add livelihoods (including payao), tourism, and aquaculture cells.

These instructions give more details about what to do at step 7, p11

This means the 'move players and set other scenarios' window should be visible. If it is not, follow the instructions from Part 2 from the beginning.

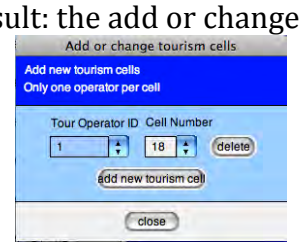
Adding, removing or changing tourism cells (for tourism operators)

1. Click the 'add tourism' button



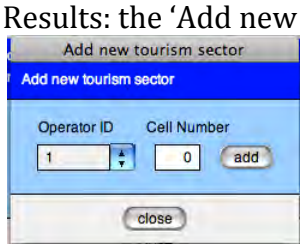
Showing add tourism button on the 'move players and set other scenarios' window

Result: the add or change tourism cells window appears



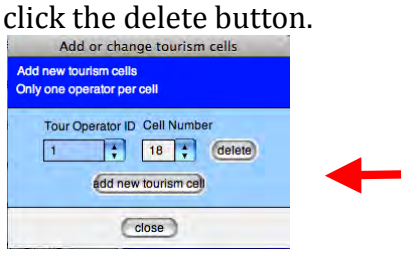
Add or change tourism cells window

2. To add a tourism cell: from the 'add or change tourism cell' window, shown above, click the 'add new tourism cell' button.
   Results: the 'Add new tourism sector window' appears



   Select the operator id and the cell number that they have put their new tourism venture on. The new cell must not have any other livelihoods and must be a land cell. Click the 'add' button.

3. To remove a tourism cell: from the 'add or change tourism cell' window select the operator number and the cell number you wish to delete, then click the delete button.



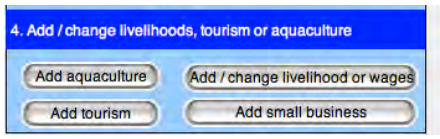
Adding aquaculture

There are two kinds of aquaculture cells. Ones owned by the Aquaculture Operator players (AOP) and the ones owned by fishers, who have bought them as an alternative or supplementary livelihood.

Aquaculture encompasses all kinds of aquaculture, including seaweed cultivation.

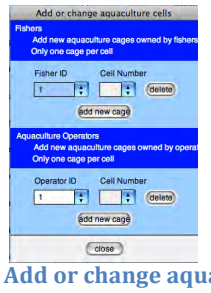
Adding aquaculture (for fishers)

1. Click the 'add aquaculture' button



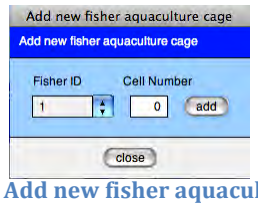
Showing add aquaculture button on the 'move players and set other scenarios' window

Result: the add or change aquaculture cells window appears



Add or change aquaculture cells window

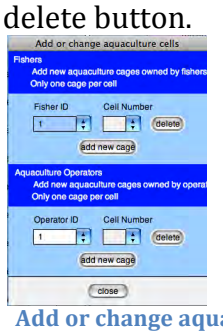
2. To add an aquaculture cell: from the 'add or change aquaculture cell' window, shown above, click the 'add new cage' button.
   Result: the 'Add new fisher aquaculture cage window' appears



Add new fisher aquaculture cage window

   Select the fisher id and the cell number that they have put their new aquaculture venture on. The new cell must not have any other livelihoods already. Click the 'add' button.

3. To remove a cage: from the 'add or change aquaculture cage' window select the fisher id and the cell number you wish to delete, then click the delete button.

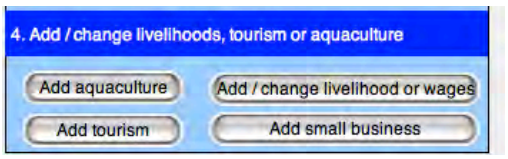


Add or change aquaculture cells window, showing delete buttons

- The livelihood code for Fishers who buy aquaculture cells is #aqu, followed by their ID number. Eg Fisher 1 is #aqu1 if they buy a cage. Fishers do not get income from the cage unless they or their son is caretaker, ie chooses the cell where their cage is located as their destination cell in any one round. Eg If Fisher 1 has a cage on cell number 144, either Fisher 1 or Son (Anak) 1/Fisher 11 will need to go to cell 144 to receive the income from aquaculture, every round of the game.
- After you've added an aquaculture cell, the chosen cell should turn pink and display the livelihood code (e.g. aqu1)

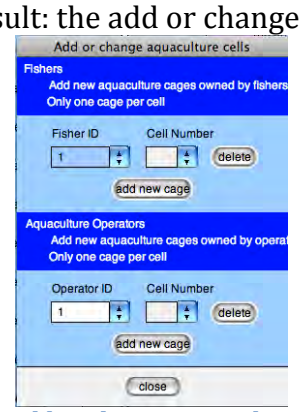
Adding aquaculture cells (for aquaculture operators)

1. Click the 'add aquaculture' button



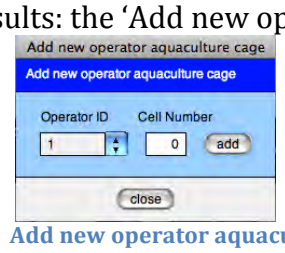
Showing add aquaculture button on the 'move players and set other scenarios' window

Result: the add or change aquaculture cells window appears



Add or change aquaculture cells window

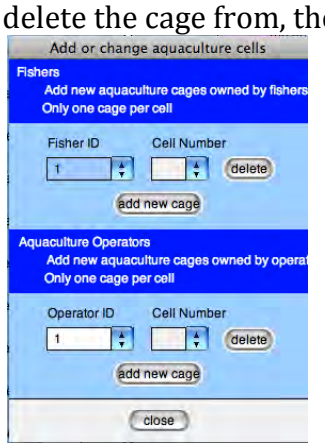
2. To add an aquaculture cell: from the 'add or change aquaculture cell' window, shown above, click the 'add new cage' button.
   Results: the 'Add new operator aquaculture cage window' appears



Add new operator aquaculture cage window

   Select the operator id and the cell number that they have put their new aquaculture venture on. The new cell must not have any other livelihoods already. Then click the 'add' button.

3. To remove an aquaculture cage: from the 'add or change aquaculture cell' window select the operator number and the cell number you wish to delete the cage from, then click the delete button.

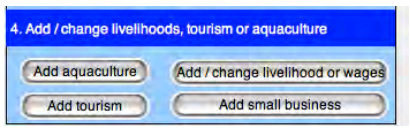


Add or change aquaculture cells window, showing delete buttons

- The livelihood code for the map for Aquaculture Operators is #aop, followed by their number. Eg Aquaculture Operator 1 is #aop1 if they want to add a cage.
- The chosen cell should turn pink and display the livelihood code (e.g. aop1)

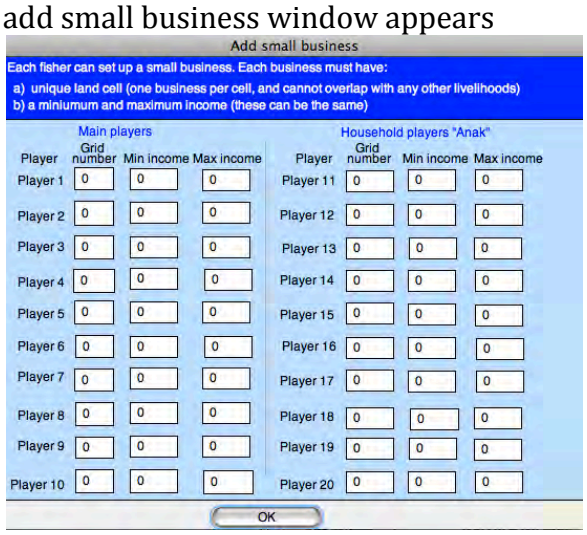
Adding small businesses

1. Click the 'add small business' button



Showing add small business button on the 'move players and set other scenarios' window

Result: the add small business window appears



Add small business window

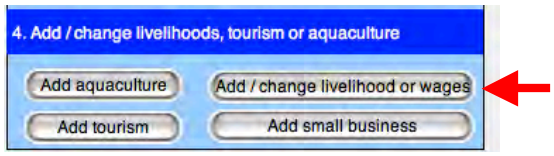
2. Next to the corresponding player/fisher id, type in the cell (grid) number where the fisher will set up his business, followed by a minimum and maximum income amount

3. Click ok to implement the changes and close the window.

- The livelihood code which appears on the map for Fishers who set up a business is #neg, followed by their ID number.
- Fishers do not get income from their businesses unless they or their son ('anak') works there, ie chooses the cell where their business is located as their destination cell in any one round. Fisher 1's business will be #neg1, and both player 1 and anak 1/player 11 will receive income if they land on that cell.

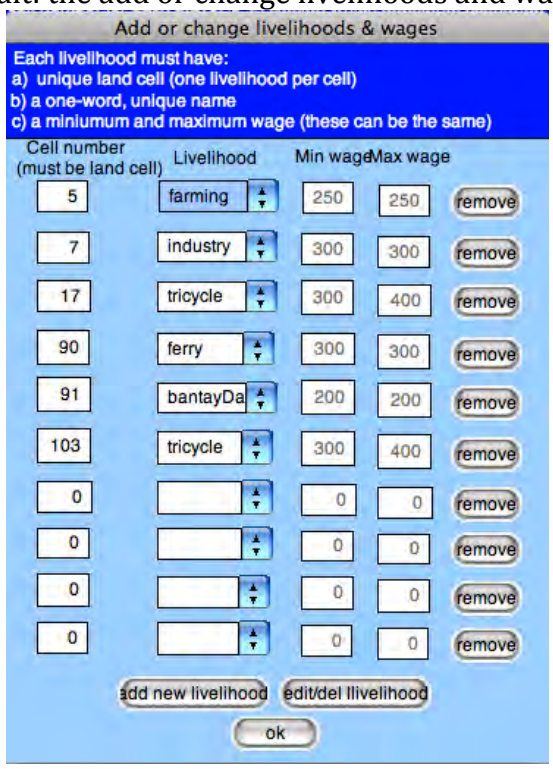
Adding, changing and removing livelihoods (including payao)

1. Click the 'add/change livelihood or wages' button



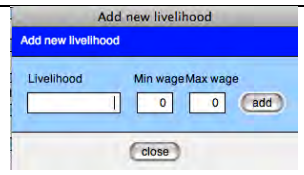
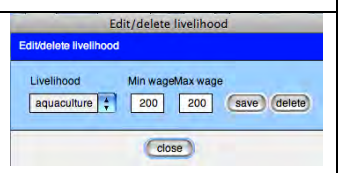
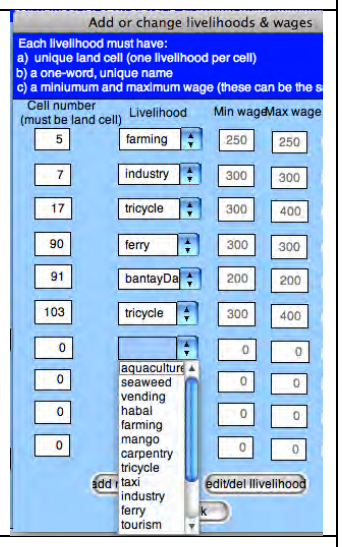
Showing add/change livelihood or wages button on the 'move players and set other scenarios' window

Result: the add or change livelihoods and wages window appears



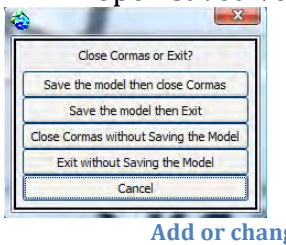
Add or change livelihood & wages window

Follow the table below to add, change or delete

Task	How	Picture
Add a new kind of livelihood (ie one that is not on the drop-down list of livelihoods)	• Click 'add new livelihood' • Type in the new livelihood's name and income range (min and max wage) • Click add • Repeat steps for any other livelihoods you want to add • Close the window	
Change the income range of a livelihood	• Click 'edit/del livelihood' button • Type in the new income range in the edit/delete livelihood window • Click save • Close the window	
Create or change the location of a livelihood	• Use the drop-down menu to assign a different livelihood to a cell (shown at right) or simply type in a different cell/grid number • Except for Payao (fish aggregating devices) and aquaculture, the cell chosen must be a land cell • Only one livelihood per land cell	
Remove a livelihood from the map	• Click the remove button to the right of the livelihood you want to remove	

Part 4: Closing the model

1. Once you have finished ReefGame, close all the windows. On closing the Simulation window you will be asked whether you want to save the model. Click 'exit without saving the model'.
   Unfortunately, the current version of ReefGame does not allow you to re-open saved versions of ReefGame.



Add or change livelihood & wages window

Part 5: Trouble shooting

The model freezes	Force quit (CRTL + ALT + Del). You will have to relaunch your model
You get an error message	Click 'proceed' and retry the step you were doing, taking extra care to put in the right variables. If the problem persists, close down and restart
The simulation window closes	To re-launch the interface stimulation window: click simulation > interface simulation from the main ReefGame menu

Appendix 5 Signed declaration from co-author

All papers were sole-authored and researched by Deborah Cleland, except Rehearsing inclusion through fisheries stakeholder workshops in the Philippines.

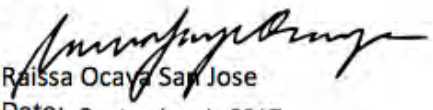
A signed declaration from co-author Raissa O'Caya San Jose is overleaf.

I, Raissa Ocaya San Jose, co-author of *Rehearsing inclusion through fisheries stakeholder workshops in the Philippines,* under review for Conservation and Society:

a) transcribed and translated the workshop videos from Filipino to English;
b) provided cultural interpretation of the same;
c) suggested culturally appropriate texts and arguments; and
d) commented on a draft.

All other research, writing, and revisions were done by Deborah Cleland

Signed:



Raissa Ocaya San Jose
Date: September 1, 2017